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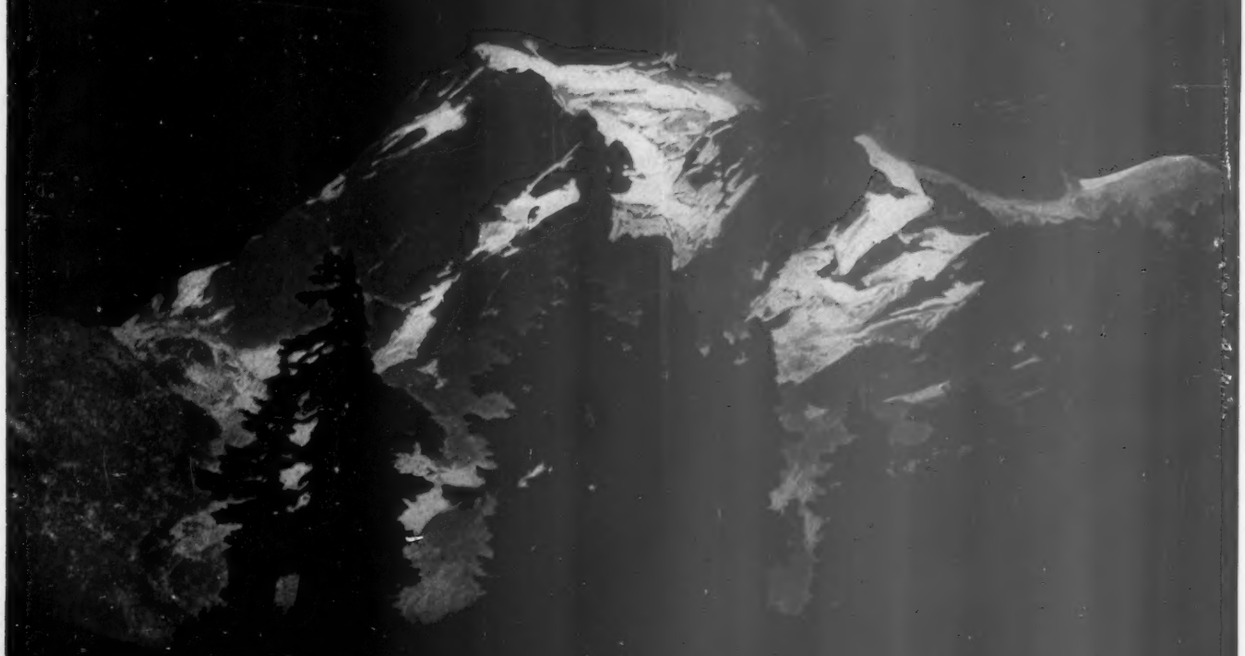

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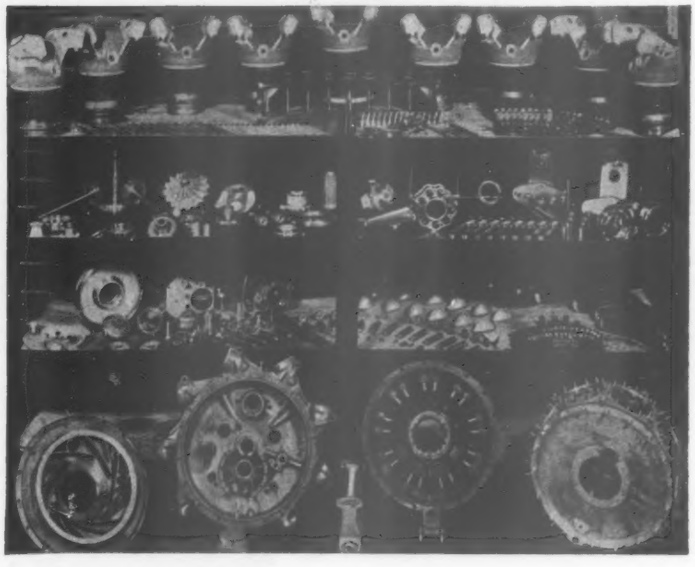

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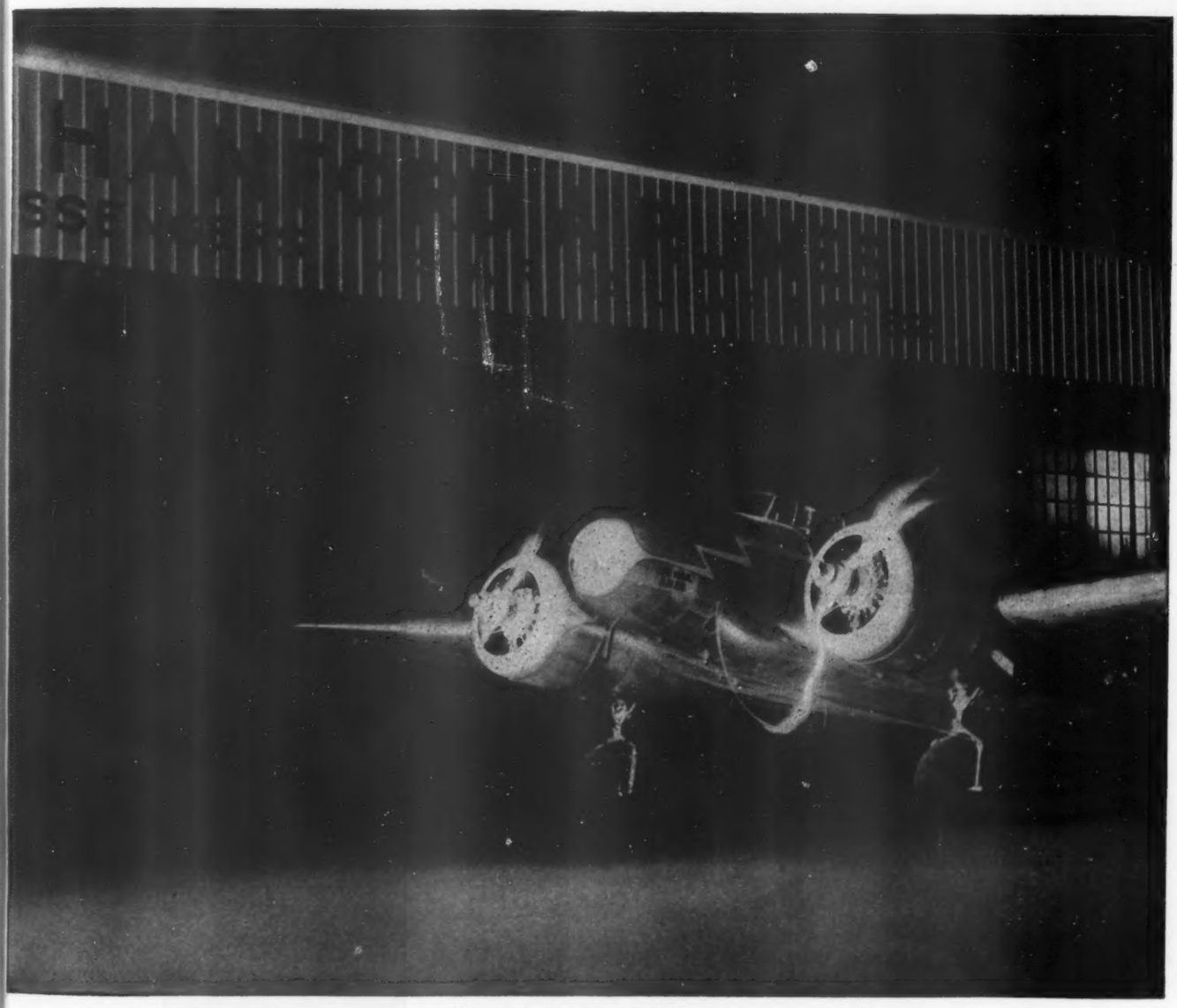

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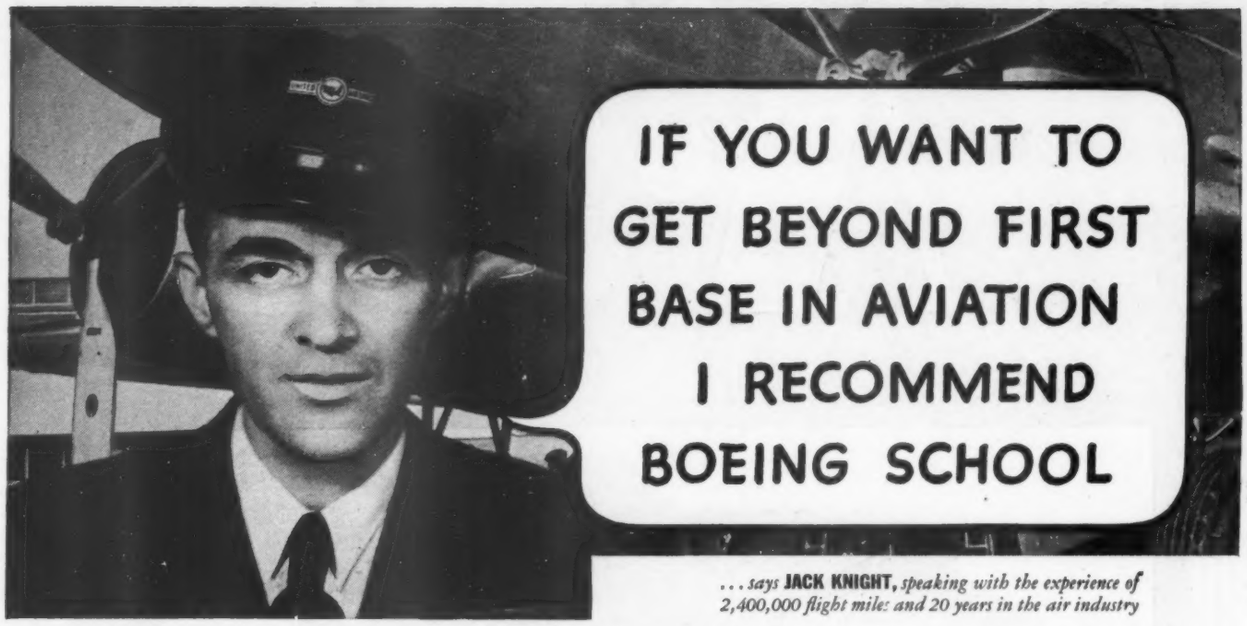

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(Nov. 1936—Oct. 1937)

Months	*Number Graduated*	*Number Placements*	*No. Co.'s Employing Graduates*
1936			
Nov. . . .	3	11	6
Dec. . . .	35	15	5
1937			
Jan. . . .	10	12	6
Feb. . . .	4	13	7
Mar. . . .	33	21	11
Apr. . . .	8	16	6
May . . .	1	16	6
June . . .	34	14	8
July . . .	5	7	2
Aug. . . .	4	2	2
Sept. . . .	20	17	7
Oct. . . .	4	3	2
TOTAL . .	161	147	27

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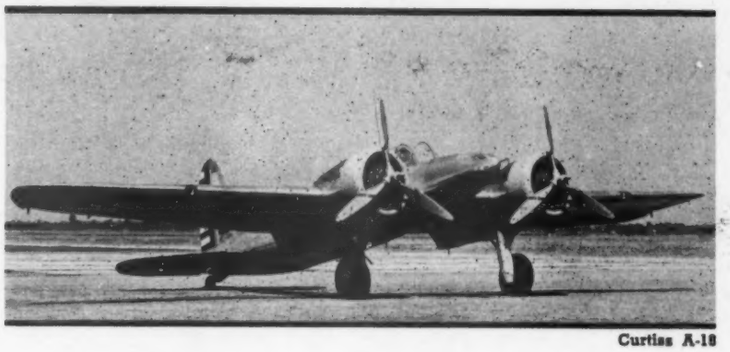

Curtiss A-18

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From the Skyways of the World

R 2148
2

» During the All American Air Races at Miami we played hookey long enough to visit the EAL and PAA bases at 36th Street and Dinner Key. In spite of a partially mended broken ankle suffered while sliding to base in a recent ball game George Rohrig piloted us around the EAL base. Of particular interest is the fine work Eastern is doing in the development and manufacture of airline radio equipment. Under a broiling Florida sun we found Les Frazer busy directing a perspiring crew installing deicers on the airplanes of the fleet. Eastern is getting ready to spread out and occupy the hangar now used as an engine shop by Pan American.

» At Dinner Key we saw the structural steel work on a new hangar being built to accommodate, among other things, the engine overhaul shop that is now being vacated at 36th Street.

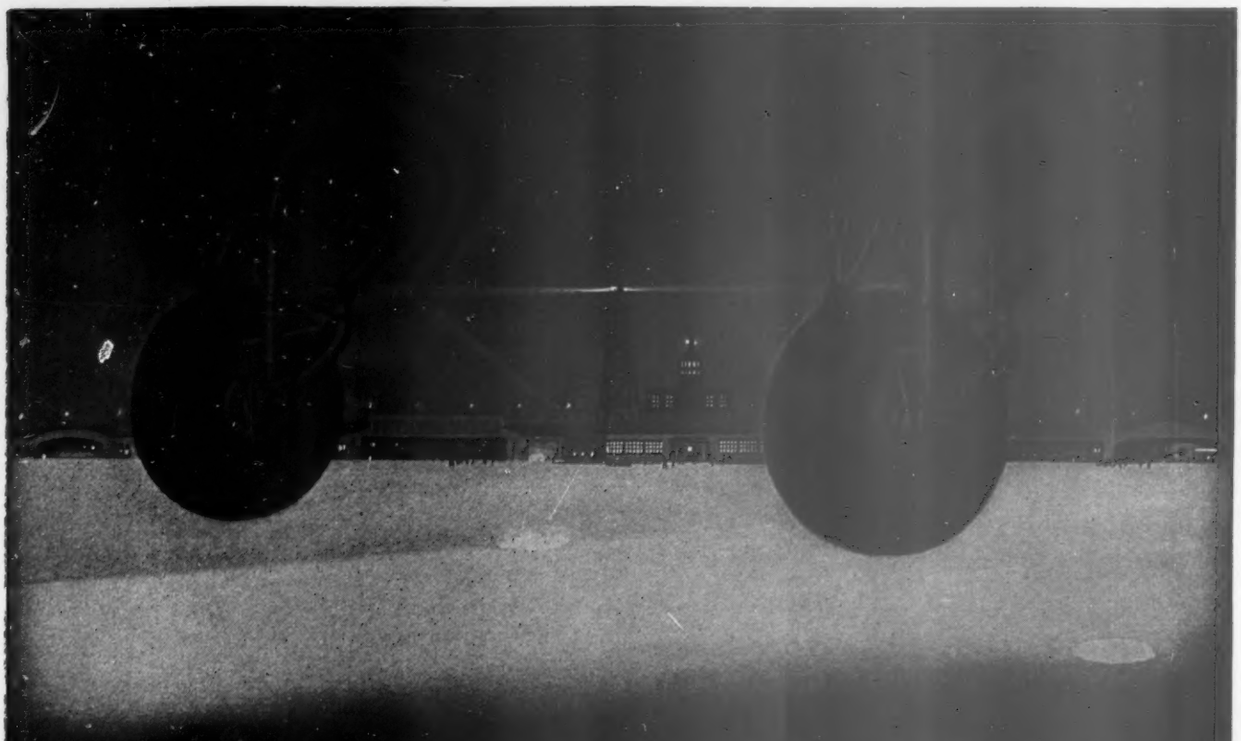
» No matter how hard-boiled we become about this business we always get a kick out of arrivals and departures at the Pan American Terminal, and so does the local population. But the biggest kick of all is that experienced by Operation's Manager E. P. Critchley who takes pride in his own handiwork and never misses a chance to watch it tick. Back in the office H. W. Toomey told us about the new plans to use DC-3 landplanes instead of seaplanes over the lower portion of the east coast route.

» Shipmates on our flight back to New York were New Jersey's Governor Hoffman and Major A. B. McMullen of Air Commerce. The Governor flew to Miami at his own expense to address the National Association of State Aviation Officials at the closing banquet of their conference. Retiring President Gill Rob. Wilson, who conducted the National Association of State Aviation Officials Conference this year, invited him.

In this issue

We face both ways with a quick look back over the major trends of 1937 (in pictures) and a dip into the future in discussion and description of hundred ton trans-oceanic flying boats. PAA's invitation to bid on such craft is a feature of the month's AVIATION NEWS,—and a story of new Consolidated project appears on page 24. . . . A survey of the progress made on modernizing our airway facilities, with special reference to this winter's problems. . . . A number of practical suggestions for handling snow on large airports as a result of experience in Minneapolis. . . . Bylor's second and final article on South American sales strategy. . . . Commander Weems finishes his lesson on Celestial Navigation with the solution of a practical problem. . . . Flying equipment includes description of Consolidated's XPB2Y-1 for the Navy; Vultee's attack bomber for export; Seversky Executive; a special photographic and survey ship by Abrams; some possibilities for the Wilford Gyroplane; two new engines by Lycoming and by Continental.

Maguire's getting lazier every day!



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Side Slips

By ROBERT OSBORN

» As we go to press the Russian scientists who were flown to the North Pole, to establish a weather base, have floated across the Arctic sea on their ice field and are now approaching the coast of Greenland.

Think what an editorial the late Arthur Brisbane would have been able to write about that!—how the Army of some future enemy could float

quietly across the Pole on a cake of ice and jump this country while we were all wintering in Florida.

» Chairman Kennedy of the Maritime Commission in testifying before a Congressional Committee strongly recommended prompt financial assistance to American companies proposing to develop trans-Atlantic Air Line services "to prevent trans-oceanic air service from being controlled by foreign interests."

Mr. Kennedy's reasoning is excellent and his recommendations certainly have the enthusiastic support of everyone in the industry. However he could have put forth another argument which might have appealed more to the average congressmen: If this administration doesn't establish subsidies of some sort, what contracts will there be for the next administration to summarily cancel because of collusion? It is high time that the New Deal made provision for its political posterity.

» Mr. Robert Ripley, of "Believe It Or Not" fame claims the "Short Haul Record of the World" for a truck used by Eastern Air Lines to refuel planes at Jacksonville, Florida. After a year of daily service the truck had run up a total of thirty eight miles.

It seems that the non-flying mechanical equipment around a flying field is always unusual and interesting. Visitors to the old Curtiss Field on Long Island were always amused by the rusty old steam roller which used to be parked between hangars. A mechanic had lettered a sign on one side of its boiler "Do not take this ship off down wind" and on the other side "Do not stunt this ship."

» We have repeatedly warned the air lines that they were violating a time-honored tradition established by the railroads in making their time tables so simple, but they pay little attention to our advice. Consider the schedule for the new service to Bermuda: The planes leave Baltimore on Tuesdays, Wednesdays, Fridays and Saturdays and passengers must be at the airport by 9 a.m. Shucks, anybody can understand that time table!

We suggest the addition of a sprinkling of asterisks, stars and daggers which refer to footnotes like "Except during the last quarter of the moon", "All children under twenty one years of age pay full fare", "Alligator, puppies and other pets not permitted in the main cabin," or "Unless otherwise noted service scheduled for Tuesdays and Fridays will be run on Tuesdays and Fridays."

» However, while cautioning the air lines against the simplicity of their time tables, we wish to compliment them for having taken action in the matter of their tickets. A few years ago we traveled by two air lines from New York to South America and all they gave us in exchange for a large sum of money was a ticket about as large as a street car transfer. From years of experience with railroad travel this picayune ticket definitely left us with a feeling of having been cheated, and we warned the air lines at the time that most of the other passengers felt the same way.

Now we are pleased to note a newspaper item about a lady in Salt Lake City who bought a ticket entitling her to 30,000 miles of air line travel, for which she paid $1,875.00. The ticket was seven feet two inches long.

» We just happened to remember, on the other hand, that that simple time table for the Bermuda service would make it easier for the fellow who has the job of ticket agent in the Islands. . . .

» The air liners, it seems, have dedicated their services to the promotion of modesty. You may remember

the incident a while ago of the Nudist Queen who arrived at Newark Airport but was prevented by Air Line officials from disembarking in the altogether,—and just the other day twelve pairs of pants were rushed by China Clipper to the San Jose State College football players who sailed to Hawaii without them.

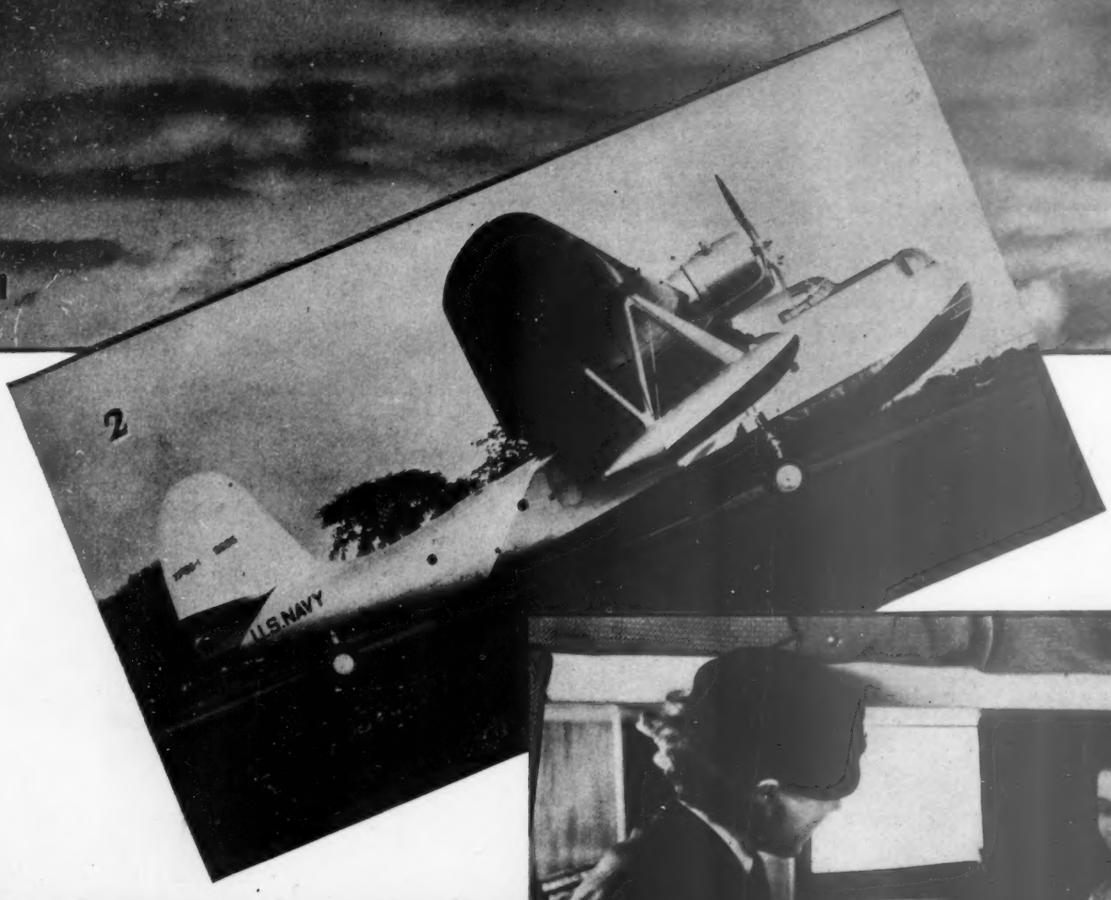
Maintenance Award

MENTION OF AIR TRANSPORTATION likely calls up in the landsman's mind pictures of sleek and shining airplanes, handsome flying officers and attractive hostesses. This is the confidence-instilling trio that the air traveller meets on the pages of his favorite magazine or on the tarmac of every airport he frequents. They make up the "front" of this great and growing industry of ours.

But behind that front is a larger and equally important group, the men and women whose job it is to keep the ships shining, sleek and SAFE for the pilots and stewardesses and for the cash customers. Our air traveller has little conception of the complexity of the machine in which he flies, nor fully realizes the magnitude nor the importance of the job done by the maintenance and overhaul departments that do their work behind the scences. Actually, however, as much as on anything else, the safe and economic performance of any air transport operation depends on how well the individuals who man those departments do their work. And that goes for every single member of the line's organization, from the boy who hoses down the undercarriage in the service hangars to the most highly skilled technician in the instrument overhaul shop.

In recognition of the quality of such behind-the-scenes work, AVIATION's Maintenance Award was established last year. The 1937 recipient was W. A. Hamilton of TWA, and a committee is now at work on the selection for 1938, the winner to be announced at the mid-January meeting of the A.T.A. Maintenance Committee. Although the Award is made each year to an individual, it represents our tribute to the high quality of work done by maintenance men everywhere.

1



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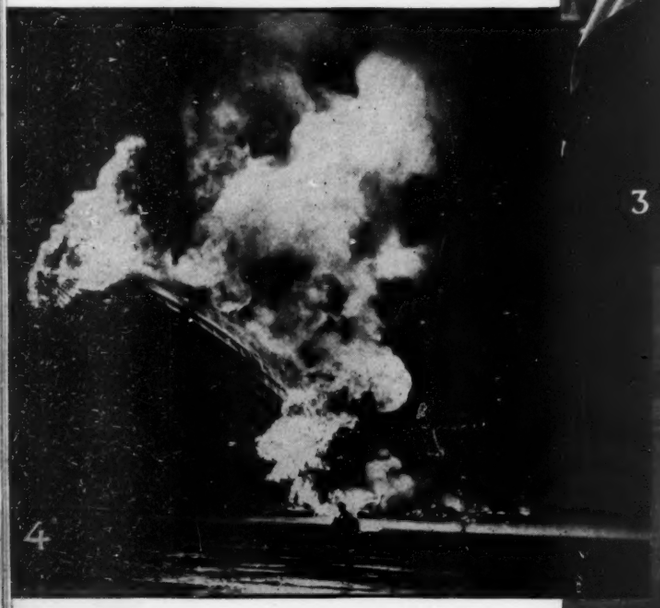

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5

It Happened in 1937

1. The Air Corps grew bigger and better with progress marked in pursuit, bombing and attack planes and in a new class—fighters. Modern planes on hand at the year's end, 1100; on order, 1100.

2. The Navy continued stress on patrol-bombers, took delivery of Sikorsky and Consolidated "flying dreadnaughts." Planes on hand, 1,000; on order, 800.

3. The airlines went luxurious. DC-3 and DST Douglases became standard on trunk routes. Traffic broke all records despite last winters accidents.

4. The Hindenburg burned at Lakehurst. Congress relaxed the helium export ban and Germany proceeded to change the LZ-130 to use that gas.

5. Students flocked to flying schools. Light plane sales were brisk. Pilot licenses rose 2,000 to 17,500. Plane licenses climbed to 7,850—up 750.

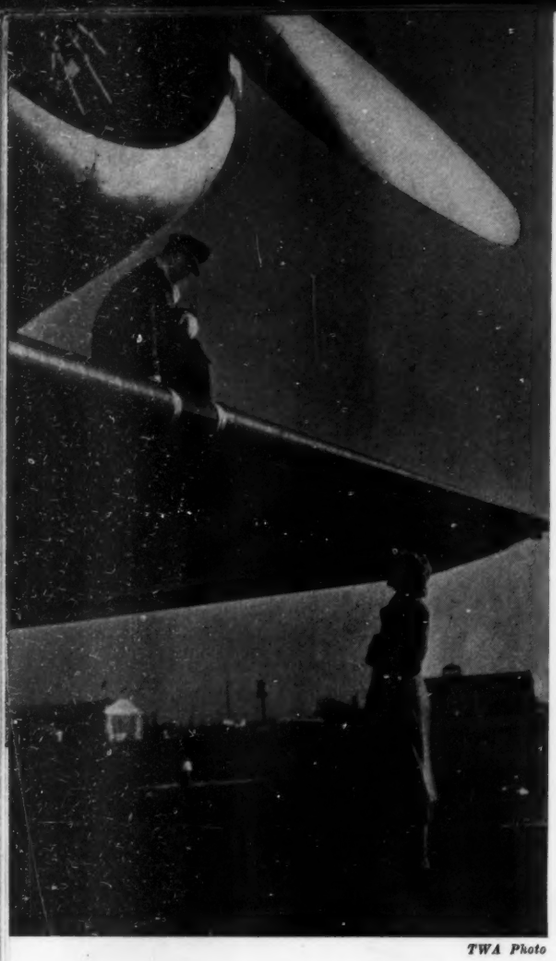
6. All Europe rushed air armament programs. England and France got more deliveries than in 1936 but still seemed behind the fascist powers.

7. Three operators moved toward final conquest of the North Atlantic. Pan American crossed it six times; Imperial eight; Lufthansa eight.

8. The Bureau of Air Commerce reorganized with Fred Fagg as head. Big jobs of the year: a new code of Civil Air Regulations; a new program of air aids.

9. The WPA spent some $35,000,000 improving 1,000 of the country's airports. Prospect of larger planes, however, kept the airport problem critical.

10. Frank Fuller won the Bendix. Rudy Kling cleaned up in the Greve and Thompson, was later killed at Miami Air Races.



TWA Photo

UNBENDING THE BEAMS

Report of Progress on modernizing the airways, with special reference to winter operations.

DE-ICING OVERSHOES, propeller slinger rings, heat- and liquid-defrosted carburetors and the other mechanical and chemical gadgets provided by airlines to help winter flying are old stories to readers of AVIATION. Familiar also are the anti-static radio antennas now required on every transport. Less familiar, perhaps, is the present status of the aids to winter navigation on the airways, the story of what has happened to those "shifting beams" with their split courses and other vagaries that have come in for their full share of criticism (some well warranted, some unjustified) in the wake of every accident that made headlines in the past eighteen months. Worth while, then, to examine briefly here what has already been done and what is projected to improve the situation in the immediate future.

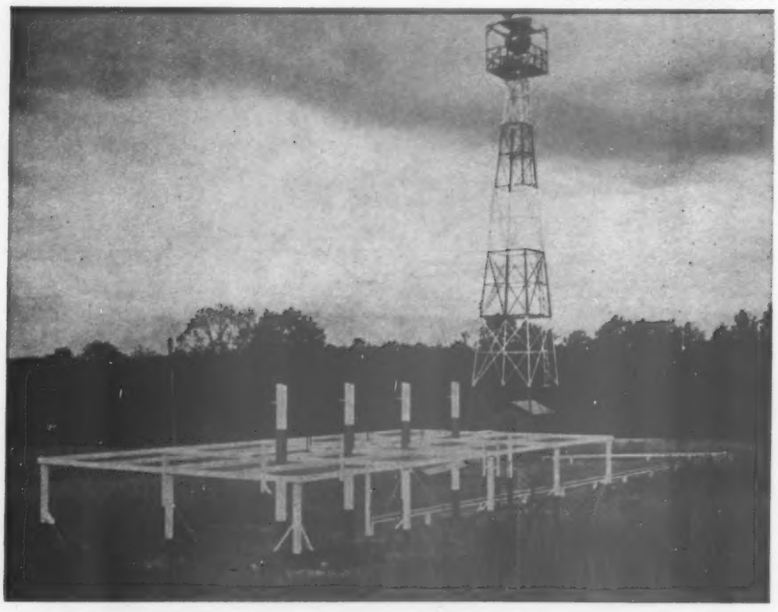
When the work of the good Doctor Copeland was at its feverish height one of his staff of experts made an exhausting (sic) tour of some 8000 miles of the country's airways to see how the beams were doing. As his tour wore on practically every beam he looked at wobbled about like a Broadway lamppost after 2 AM, or immediately provided itself with a double.

Whatever he saw, his subsequent testimony lent some weight to a growing feeling that, although the then-existing radio range system may have been good enough for our forefathers sitting on mail sacks in DH4s, it didn't measure up to the requirements of today's portly business men reclining in Skylounges and stayed from their appointed rounds by "neither snow nor rain nor . . . gloom of night."

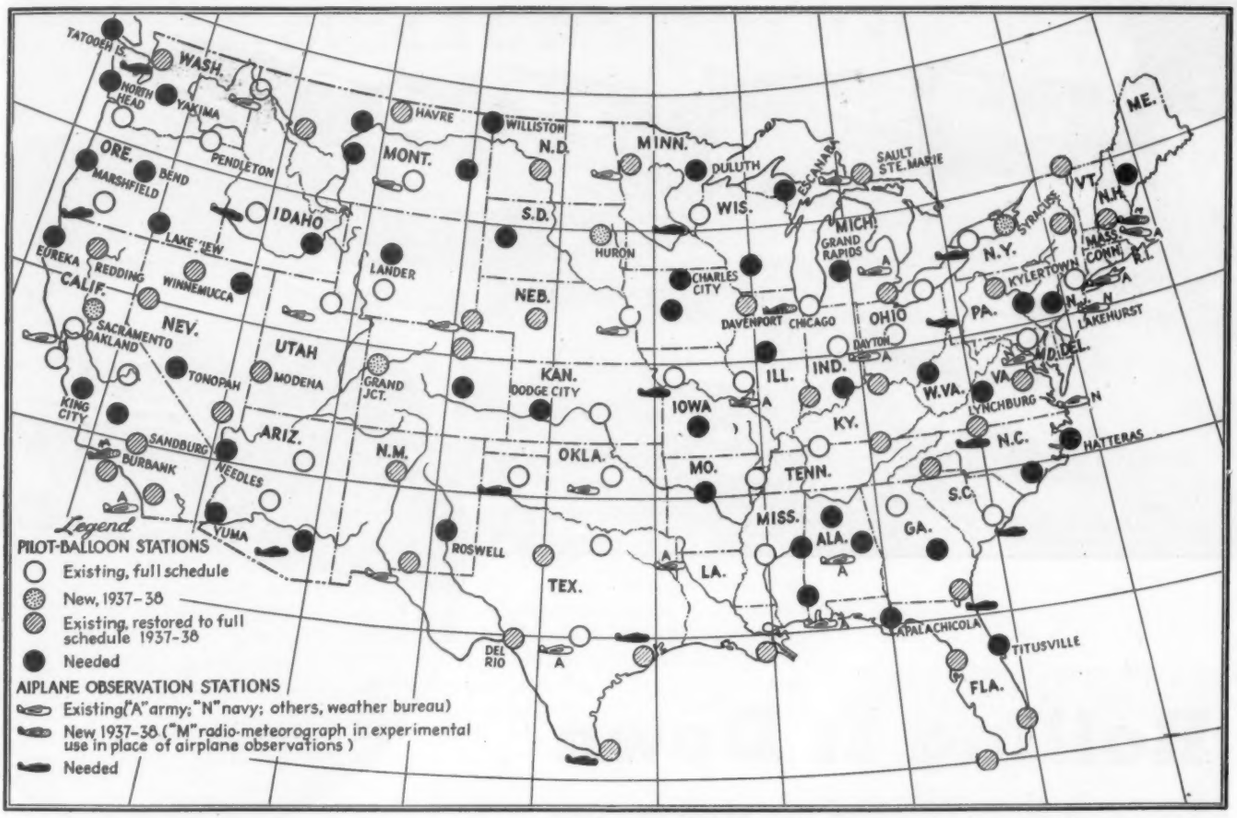
Once the difficulties were recognised, the first and most sensible move was a bit of stock-taking. Commerce, with a promise of certain long deferred and necessary funds "in the bag", asked the airlines what needed doing, and in what order of precedence. Colonel Gorrell with the ATA at his back sprang into the breach and presently whipped together the now-famous Master List (since several times revised) of some 900 odd spots on the airways map urgently in need of attention. Commerce, true to its word, pried a total of $7,000,000 out of the Boys on the Hill, and immediately set to work. The first $3,000,000 is in the clear for the current year's spending, but the Secretary of Commerce is authorized to incur additional contractural obligations up to another $2,000,000 prior to June 30, 1938, and may also sign up for yet another $2,000,000 between that date and June 30, 1939—all for the modernization of our airways system.

Although most of us would welcome a try at it, the spending of $5,000,000 is no easy matter, especially if one has to demonstrate "full value received" to a gallery of kibitzers as critical as our two dozen airlines and our two-dozen-million taxpayers. Through a sweltering Washington summer Commerce person-

Bureau of Air Commerce Photo



Antenna for ultra-high frequency "curtain" marker beacon installation. Four half-wave radiators are mounted on the white posts (see text, page 67).



WHAT WE HAVE, WHAT WE ARE GOING TO GET, AND WHAT WE NEED in new facilities for collecting weather information for airways use. Prevalence of the black spots on the map indicates that much still remains to be done before the situation will be satisfactory to the airlines. (Chart prepared by the Air Transport Association of America.)

nel sweated over priority lists, specifications, contracts. The program included (a) conversion of 10 4-tower range stations to the modern 5-tower type; (b) construction of 46 new simultaneous transmission range and telephone stations at key points; (c) construction of 29 medium and low powered loop type range markers at critical points on airways; (d) replacing obsolete ranges with new simultaneous types at 76 key points; (e) installing 21 ultra-high frequency fan type markers near principal terminal airports for traffic control; (f) providing 162 "cone of silence" markers; (g) providing auxilliary power supply sets at 89 stations not now equipped; (h) installing approximately 7000 miles of additional teletype circuits; and (i) installing numerous airway and airport lighting improvements. By and large, quite an assignment.

How well the Bureau got under way is disclosed by the following excerpts from a report recently submitted to the Director's office by the Chief of the Airways Engineering Division. It covers the status of the projects scheduled for the calendar year 1937, as set up in the Master List.

A. Capacity of the 13,000 mile teletype communications system existing January 1, 1937 increased 50% by purchase and installation of equipment permitting increase in operating speed from 40 words per minute to 60 words per minute.

B. Extension of the system by adding 7500 miles of circuits including approximately 100 drops, at all of which hourly weather reports will be transmitted. All now operating except 200 miles which will be completed by January 1.

C. Commissioning two full-powered simultaneous radio range and communications stations equipped with the latest improved five tower transmitting systems and counterpoises at Delta, Utah, which will be completed by January 1, and Mullan, Idaho, where radio service has not hitherto been available.

D. Commissioning 12 medium powered simultaneous radio range and communications stations equipped with the latest improved five tower transmitting systems and counterpoises at points where radio service has not hitherto been available.

Gordonsville, Va.	Enterprise, Utah
Pulaski, Va.	Phoenix, Ariz.
Lynchburg, Va.	Blythe, Calif.
Briston, Tenn.	Hartford, Conn., (complete by Jan. 1)
Smithville, Tenn.	Bangor, Maine
Las Vegas, Nev.	Whitehall, Mont., (complete by Dec. 1)

Temporary radio range facilities at Dallas and Long Beach will be in service by December 1.

E. Commissioning 6 medium-powered radio range and communications stations at points where radio service has not hitherto been available.

Portland, Maine	Superior, Mont.
Augusta, Maine	Belgrade, Mont.
Concord, N. H.	Floyd Bennett, N. Y.

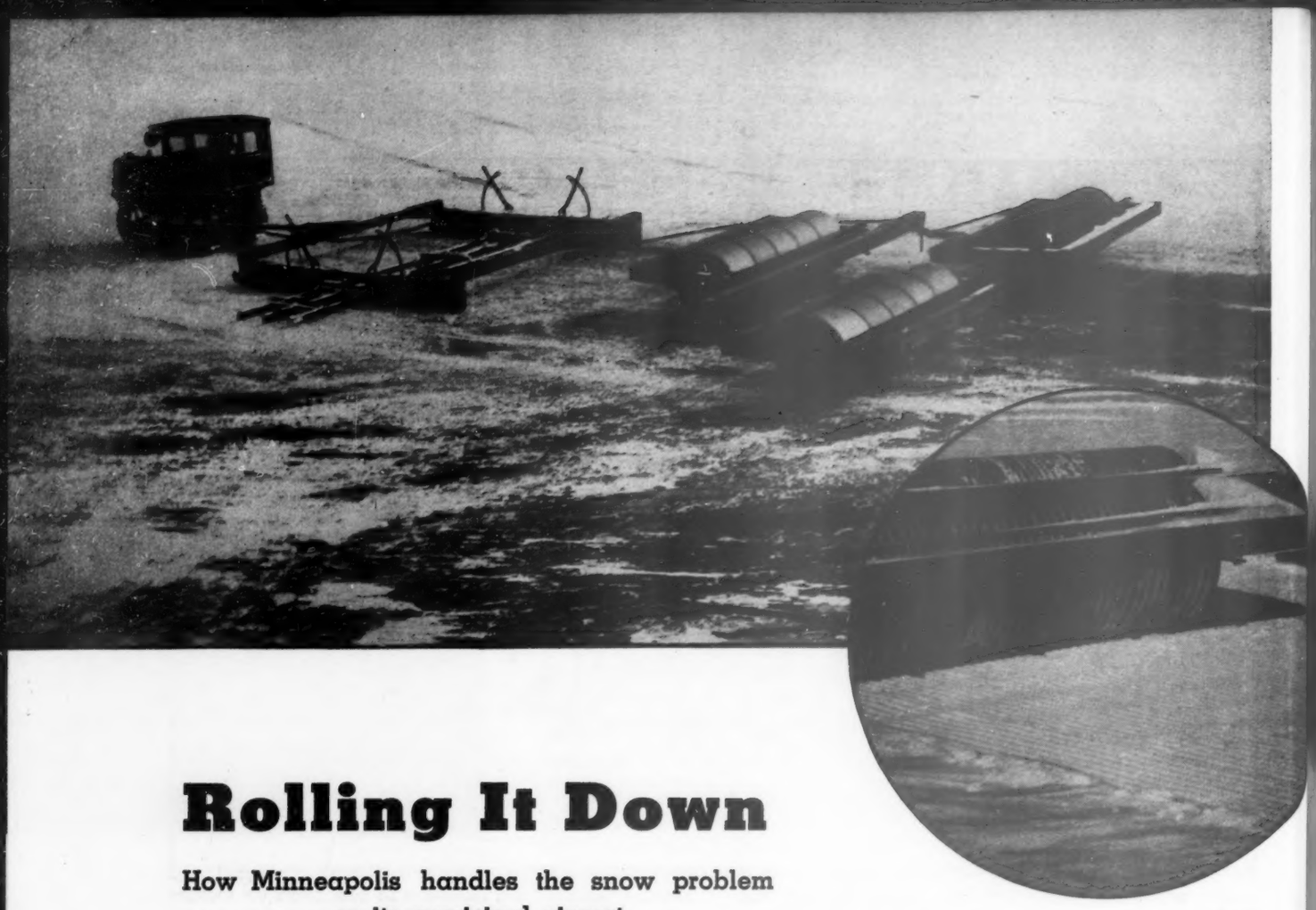
F. Commissioning 2 low-powered radio localizers at Tylertown, Miss., and Navasota, Texas, where radio range service has not previously been available.

G. Commissioning a radio range station at Akron, Ohio, where radio service has not hitherto been available.

H. Commissioning 3 new full-powered simultaneous radio range and broadcast stations, equipped with latest improved five tower transmission systems and counterpoises at Nashville, Tenn., St. Louis, Mo., and Chattanooga, Tenn., replacing the obsolescent radio stations at those points.

I. Converting the radio stations at Fort Worth, Texas, and Fresno, Calif., to simultaneous radio range and communications stations.

(Turn to page 67)



Rolling It Down

How Minneapolis handles the snow problem on its municipal airport.

On a recent visit to Wold-Chamberlain Field, Minneapolis Municipal Airport, L. D. Hammond, Airport Director, told us something of his method for handling snow. His system was so interesting and so practical that we felt it worthwhile to reproduce some of its details herewith, not, however, as the final answer to the snow-handling problem, but as a very decided step towards a practical solution. Mr. Hammond and the editors of AVIATION *would welcome any suggestions or criticisms from anyone engaged in the difficult task of handling snow on airports.*

AFTER SOME EIGHT YEARS of experimental work with snow plows, drags, scrapers, and rollers of various types, the management of Wold-Chamberlain Field at Minneapolis has evolved a snow-handling equipment that is giving very excellent results. During the winter of 1936-37 the field was in constant use by Northwest Air Lines' and Hanford's Lockheed Electras, and this year no trouble is anticipated in taking care of the newer and heavier Lockheed 14's now going into service.

The details of the equipment are shown on the accompanying drawing and photographs, a drag for cutting off and leveling drifts and a set of rollers to compact the snow. The essential idea is not to attempt to remove snow from runways but to continually roll or to compact snowfalls on top of the runways so that planes actually land on a paving of snow and ice, the runway level being continuously raised during the period of snowfall and continuously lowered during the melting season.

Under certain conditions auxiliary equipment in the form of spring-tooth or spike-tooth harrows is required to prepare the snow for leveling or compacting. If the snow is too wet for rolling the spring-tooth harrows are used ahead of spike-tooth harrows. The former loosens up the snow, and the spike-tooth harrows break up and level any chunks of snow that are left. After such treatment, the runways may be rolled. If the snow is too hard-crusted, either the spring or the spike-tooth harrows may be used ahead of the regular roller or drag, depending on conditions.

The equipment at Minneapolis is drawn by a 28-hp. Caterpillar tractor. Under average conditions a speed of 5 m.p.h. may be maintained, dragging and rolling a 27-ft. strip. It costs $2.75 an hour for the tractor and the operator. The original cost of the equipment is about $150 to $200 for the drag and between $300 and $400 for the three rollers.

Experience has indicated that it is best to wait until after a snowstorm has subsided before attempting to roll runways. Attempting to roll during a storm is usually wasted effort. It has been found also that conditions for rolling and dragging are often better after nightfall. For this reason the tractor should be provided with good headlight equipment and also with whatever air-heating equipment is necessary for proper operation or for the comfort of the operator.

The 1936-37 winter season at Minneapolis was characterized by a combination of moderate to heavy snows

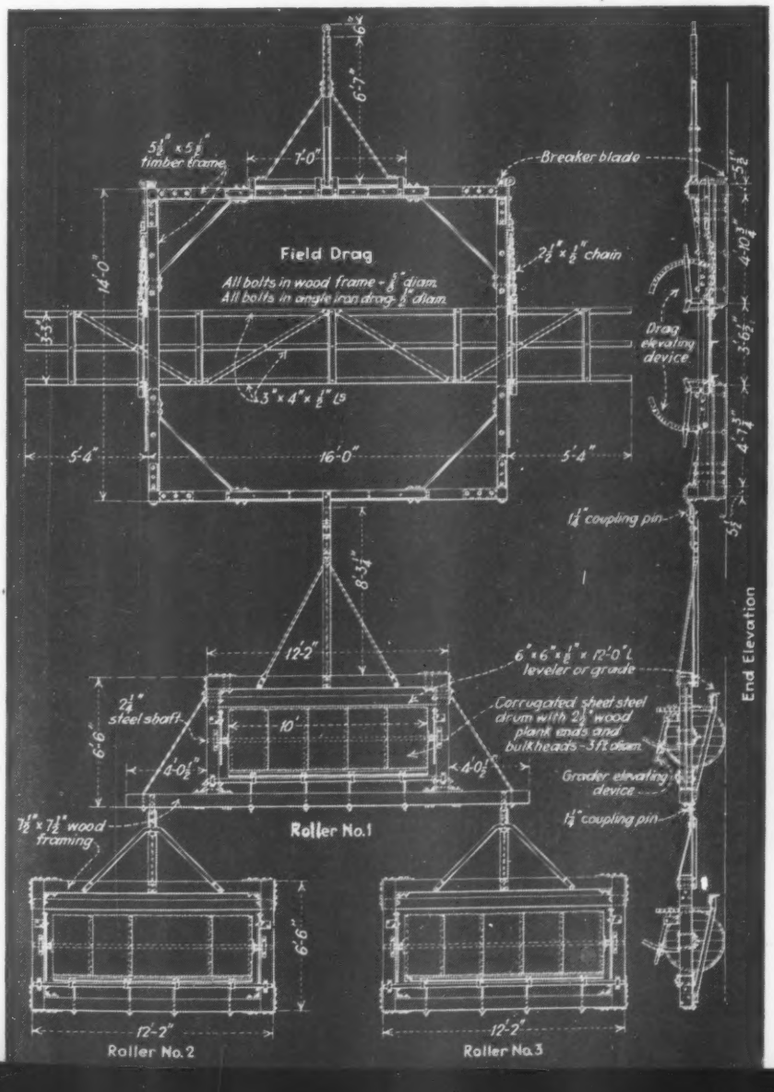
(4 in. to 12 in.), and high winds. The roller and drag units were used either separately or in tandem as the situation required. The drag height was adjusted to level drifts or mounds and the roller units ordinarily finished the job in one operation. Where drifts ran from 12 to 18 in. deep, the drag was used alone at first to cut off part of the mound and to spread the snow evenly. Then the drag with the roller attached were used as a second operation to finish the job.

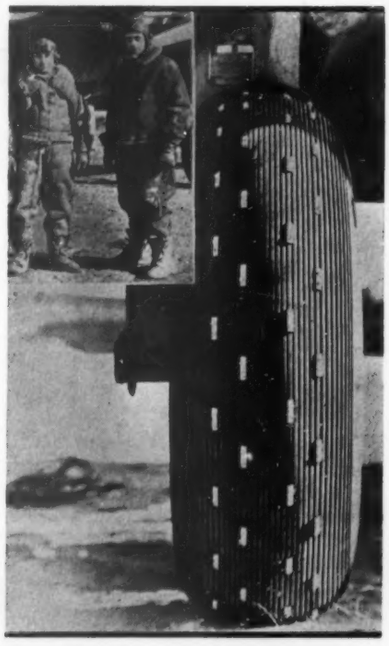
At one time a situation developed where the field became coated with ice before the first snow fell. As a result the field was covered with drifts up to 18 in. with bare ice spots between. An attempt was made to pull the drag ahead of the roller but due to the slippage and the distance between the tractor and the roller, it was impossible to move it dead ahead. Two operations had to be adopted, the first was the use of the drag to level off the mounds and the second was to use the roller to compact the snow. As a result of this experience, adjustable angle iron drags were added to each roller unit (as shown on the drawing) and it has been found that this addition has made it possible to do the job in one operation under most circumstances without the big drag.

It was also found that under certain conditions it is necessary to back up the unit which accounts for the use of rigid tongues between the several units of the combination.

Minneapolis has had several interesting experiences during periods of thaw. Midwinter thaws have not caused much trouble because as soon as any soft spots or holes on the runway appeared they were lightly scarified with the harrow so that the whole surface became uniformly soft. For two years spring thaws gave no trouble, for as soon as the surfaces of the runways became soft, they would immediately be scarified to a depth of 2 or 3 inches. The surface snow melted off uniformly and the underlying ice remained solid. The third year, however, a new situation developed in which weather conditions were such that the runway surfaces remained hard but the underlying ice gave way and occasionally a plane broke through. This condition was probably due to the fact that the sun's rays penetrated the compacted snow and weakened the underpinning. The solution seemed to be to scarify the surface well before the melting period might begin, which would put the surface into a roughened condition similar to free-fallen snow. A layer of loose snow acts more or less as an insulator and prevents the sun's rays penetrating to a sufficient depth to melt the underpinning.

Generally speaking, the method outlined above has proven very satisfactory and economical and has provided satisfactory surfaces for the landing of large airplanes during stretches of exceedingly bad weather. One more thing might be done to improve the situation, and that would be to add a piece of equipment that might shave off the compacted snow surface just before spring thawing begins and depend on the strong spring winds to blow the loose shavings off the runway surfaces. That, however, is for future development.





Cleats for Tires

At Selfridge Field, the Army Air Corps has been experimenting this winter with steel cleats embedded in the tread of low pressure airplane tires with a view to obtaining greater traction during take-off and landings on ice-coated runways. An application to a General Streamline low-pressure tire is shown above. Colonel Walter H. Frank, Commander of the Cold Weather Equipment Test Group, has been conducting the experiments.

Consolidated's TRANS-OCEANIC Project

A design for a 54 passenger flying boat of 110,000 pounds gross with all the comforts of a luxury liner.

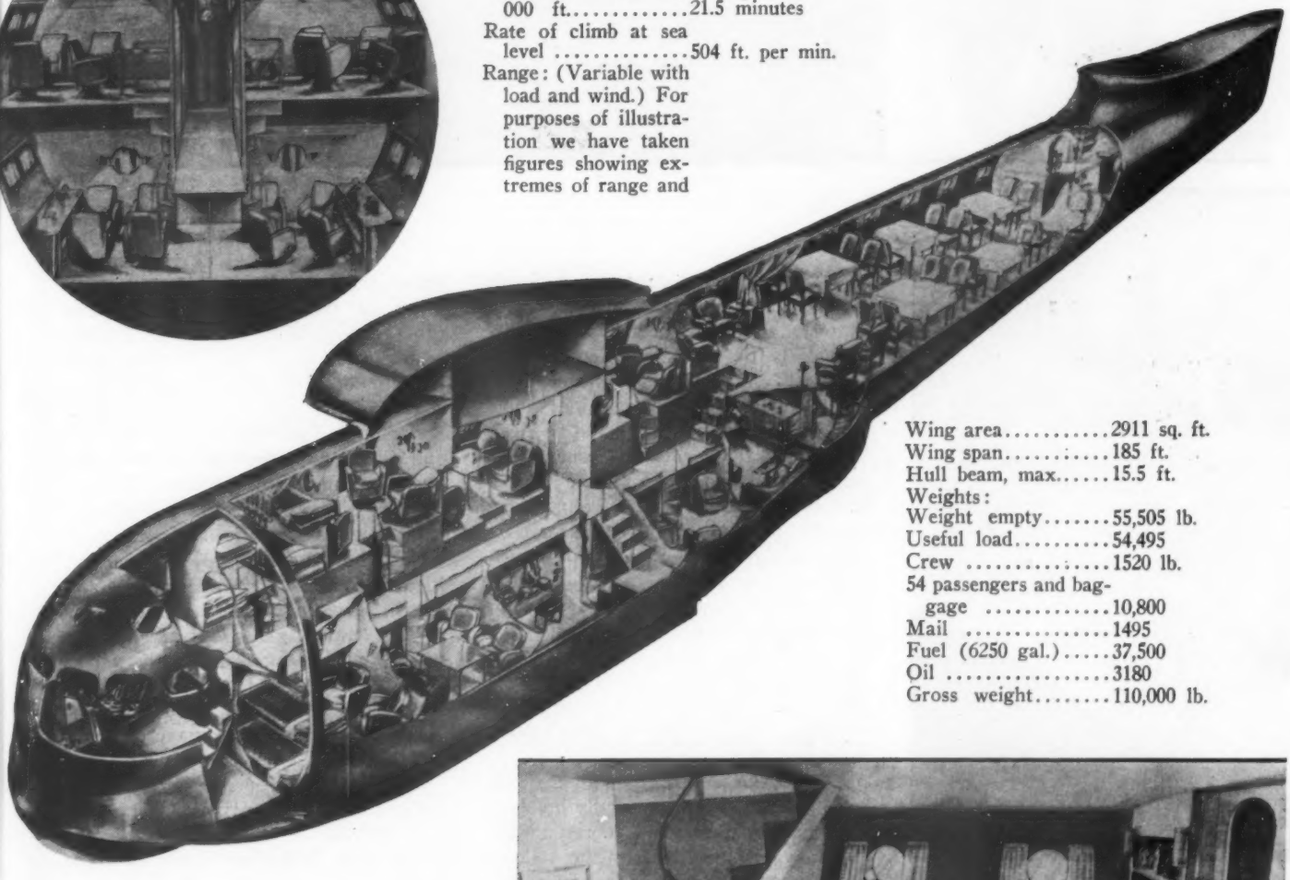
OUR FOREIGN COUSINS can hardly be blamed if they blink a little at the speed with which Uncle Sam's aircraft builders have been turning out bigger and better flying boats with which to dominate the world's ocean air routes. We are even a little stirred and startled ourselves to note what a commanding position American designers and builders have won not only with commercial ocean aircraft, but with the huge long range naval patrol boats so valuable in guarding the commercial air routes established. We have been kept mentally leaping from coast to coast during 1937 (and physically too) to keep up with developments. We've given attention in turn to the Boeing 314 in Seattle, the Sikorsky "flying dreadnaught" in Bridgeport, the Martin 156, and the Consolidated XPB2Y-1 in San Diego. But climaxing this busy year for boats, came the announcement late in December of the projected Consolidated trans-oceanic flying boat, marking the re-entry of the Consolidated company into the commercial field. Announcement of general specifications of this plane, with detailed disclosure of cabin arrangements for passenger accommodations gives the prospective trans-oceanic traveler of 1939-40 a glimpse of the equipment he may expect to use. For in announcing this flying boat the Consolidated Aircraft Corp. has indicated that it is willing to undertake construction immediately on a fleet of such planes. It is said that more than $100,000 has already been expended in preliminary engineering on this project. With trans-oceanic passenger flying rapidly winning wide public favor it is safe to estimate that Consolidated will shortly find its vast factory facilities sorely taxed to meet the demand for such ships, and that other American manufacturers of comparable equipment will be called upon to speed production in order to meet world demand for trans-oceanic type planes.

DESIGNED to provide luxurious accommodations for both day and night travel for fifty-four passengers and a crew of ten, the new Consolidated trans-oceanic plane will feature two main passenger decks on which will be located a total of fourteen passenger cabins arranged to accommodate from two to four passengers each. The upper deck extends straight back through the hull to the tail in which the galley and cook's quarters is located. A dining hall on this deck accommodates twenty guests at six tables. On the lower passenger deck, which occupies the lower fore-part of the hull, there are six passenger cabins, wash rooms, crews quarters, and a luxurious cock-

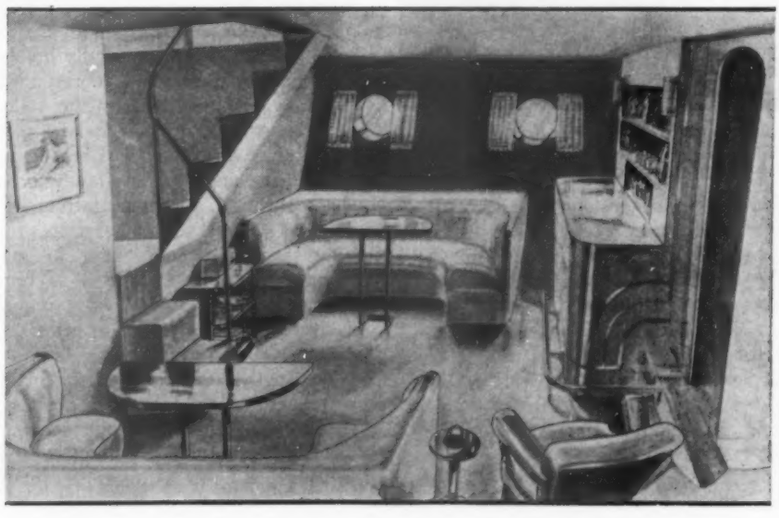
tail lounge. A companionway extends through the length of the living quarters and communicates at intervals with both lower and upper decks by means of short stairways.

In general design the Consolidated trans-oceanic flying boat is conventional, with a single hull on which is mounted the cantilever wing carrying the four engines. Wing floats are retractable in flight into the underside of the wing. The fuselage is approximately circular in cross section throughout its length, except for the boat bottom portion, and features a smoothly rounded nose in which the pilot's cockpit is located clear forward. Gross weight of the plane loaded is 110,000 lbs., wing span 185 ft. and top speed 226 mph. Detailed specifications as released by the manufacturer are listed as follows:

Gross weight.....110,000 lb.
High speed at 10,000 ft altitude .....226 mph
High speed at sea level205 mph
Full load stalling speed67.7 mph
Service ceiling .....16,600 ft.
Time to climb to 10,000 ft.....21.5 minutes
Rate of climb at sea level .....504 ft. per min.
Range: (Variable with load and wind.) For purposes of illustration we have taken figures showing extremes of range and payload, assuming still air.....6,000 a miles with 10,000 lb. payload. 3,000 miles with 30,000 lb. payload.
Take-off time in still air .....67 seconds.
Brake horsepower from sea level to 10,000 ft. altitude..4800 at 2100 rpm
Brake horsepower for take-off .....6000 at 2300 rpm
Propeller diameter...16 ft.
Propeller gear ratio..2 to 1.
Airfoil .....NACA 21 (modified)
Wing loading.....37.8 lbs. per sq. ft.
Power loading.....22.9 lbs. per h.p.



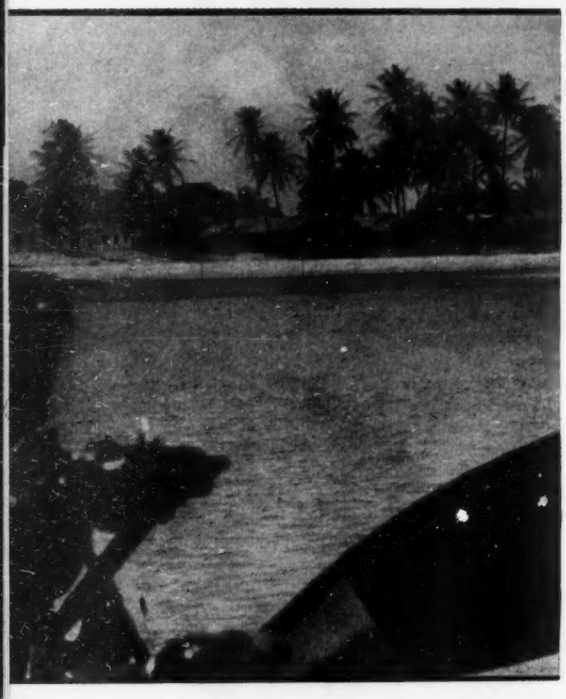
Wing area.....2911 sq. ft.
Wing span.....185 ft.
Hull beam, max.....15.5 ft.
Weights:
Weight empty.....55,505 lb.
Useful load.....54,495
Crew .....1520 lb.
54 passengers and baggage 10,800
Mail 1495
Fuel (6250 gal.).....37,500
Oil 3180
Gross weight.....110,000 lb.



Above: A section through the hull showing the day arrangement of the double-deck cabin.

Center: Phantom view of the 54 passenger boat showing arrangement of passenger accommodations.

Right: The cocktail lounge amidships on the lower deck.



The second of two articles

By
H. T. Byler

UNDER EXISTING CONDITIONS, South American commercial aircraft representatives cannot make a fair living solely by the sale of commercial aircraft. Most representatives have other outside interests besides their activity in aviation. It should be clear therefore, that without some well organized assistance from home offices first class representation is impossible. Merely appointing a representative, and indulging in occasional correspondence concerning the designation of commissions and or the forwarding of catalogues in English is usually just so much time and energy wasted. Often the net result is only the inclusion of the manufacturer's name on the so-called representative's letterhead—if he has one.

The routine connected with the sale of commercial aircraft usually involves both manufacturer and representative and may be illustrated by the following composite case which relates to the bargaining instinct of Latin-American buyers, and their hesitancy to purchase through a representative. The prospect writes the factory about his interest in the equipment, in many cases asks to be appointed as representative in his locality and requests a discount on the purchase price. The factory may receive such letters in good English, terrific English, Spanish or Portugese and usually replies to them stating that the manufacturer is already represented and requesting the prospect to contact the representative (who may actually be almost as far away as the home factory). The prospect generally receives his answer in about 60 days' time, because it is probably both request and answer were sent by boat mail. If the prospect understands the reply in English, well and good, but if the reply is brief and misinterpreted your contact is lost.

A suggestion offered toward a better contact on letters of inquiry is this: make up a standard reply to letters of inquiry, send it to your Portugese and Spanish speaking representatives for careful translation, with the proper heading, salutations, etc. in both languages. Have it typed carefully by the representative using the proper characters in both languages. Then buy a special typewriter (or convert one) with the proper characters and use one of your own typists (who does not necessarily need to know languages) to make up copies of these letters.

Letters should contain the following information to make everything clear to the prospect and assist your representative in making the sale:

1. That the f.o.b. and c.i.f. price of aircraft are identical with either factory or representative, and the purchaser is given his choice with whom he wishes to deal.
2. If possible, give the price of the equipment in both American and foreign currency, noting that the price given is based on that day's

Common Courtesy and Common Sense

are the essentials for

Successful Marketing "DOWN UNDER"

Some practical advice to American manufacturers who are ambitious to make sales in the Americas below the Equator.

exchange corresponding with the date of the letter, and that any down payment or balance must be based on the exchange the day the deposit is made through your banking connections.

3. Give all performance and data in the metric system.
4. State only standard equipment. Personal experience has shown that in reading English catalogues the standard and special equipment is sometimes misinterpreted by prospect to mean that both are included in price of equipment.
5. Give a detailed list of your c.i.f. price, naturally excluding any fees at port of entry.
6. Give an approximate delivery time based on receipt of down payment.
7. Suggest additional parts order to take care of first top overhaul and give the cost of such a list of parts.
8. Acknowledge or explain your accepted routine for payment, and explain whether it is cash with order, down payment, and balance against documents at factory, or with banking contacts in country of prospect's inquiry.
9. Suggest again the present and future help the representative can give to the buyer, if the contact is close enough to warrant representative's interest.
10. Send by air mail.

A follow-up letter by boat mail, made up in the same manner by you and your representative should also be sent. It is always well to remember that the majority of Latin-Americans are sticklers for form and courtesy and that they love details. Taking advantage of these facts will never harm any company interested in promoting good will and sales.

The demonstrator's problem is without doubt the most difficult of all, because the manufacturer cannot afford to place demonstrator at the disposal of representative, and in most cases the representative or export organization cannot afford it. The usual system is to appoint as representative the first purchaser of the equipment, which restricts the usefulness of the plan to a very limited area. Also if the purchaser happens to be an operating company, loss of profit may be incurred by taking the equipment away from its base. Under these conditions it is obvious that the solution to this problem is to restrict the territory allotted to a representative. The appointment of representatives by continent, country or huge territories is wasted effort. The territory or area should be of a reasonable radius from the representative's headquarters.

Business and sport rivalry between cities, countries, companies and individuals are notoriously hot and do enter the picture. A good example is the rivalry between the states of Rio de Janeiro and Sao Paulo. What the wealthy Cariocan buys in aircraft is sneered upon by the Paulistas, and vice versa. A commercial aircraft representative operating out of Rio will buck a very tough assignment attempting to sell his equipment in Sao Paulo, even if the equipment is lightly favored. Santos, Sao Paulo's satellite city has the same feeling, while Bello Horizonte, another population center leans towards Rio. These four cities contain a big percentage of the total prospects in Brazil that can afford to buy aircraft. Under these circumstances it is obviously foolish for any manufacturer to be represented in the four cities by a single individual or company, but that situation actually exists to the detriment of the manufacturer.

One solution to the demonstrator problem is appointment of representatives, by sales, in carefully chosen and restricted areas, or waive all profit to your present representatives without demonstrators in order to break into the market.

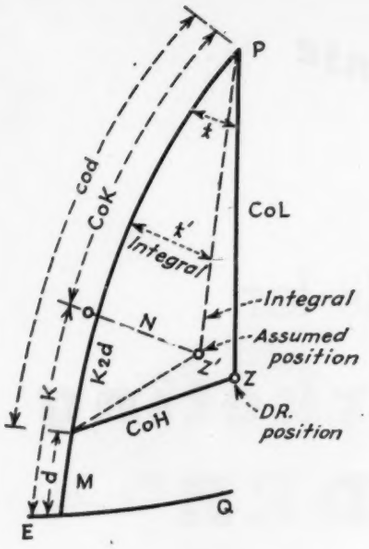
Exchange is a necessary evil but at certain times it can be an advantage. The manufacturer that is interested in South American sales would do well to watch the market through his representatives. The obvious reason is that when exchange is favorable there is considerably more opportunity for making sales. For example, the c.i.f. price of American equipment is quite stable over the period of a year, but

(*Turn to page* 68)

AIR NAVIGATION

Finding Your Way in the Air

CELESTIAL NAVIGATION PRACTICE



In the right triangle PZO, we know the values of t and L. Table A gives for all integral values of t and L the corresponding values of A (=log sec N) and of K. The angle K is combined with d algebraically to get K~d, and with K~d as an argument, we find in Table B the value of (B = log sec (K~d)). The sum of A and B is log cosec H, from which H is found by entering table B at the bottom. In order to avoid interpolation in Table A, an assumed position, Z', is used such that both t and L will be integral degrees.

Fig. 1. Method of Handling Navigation Triangle by Line of Position Book. P—Pole; Z—Zenith of the observer; M—Body observed; L—Latitude; d—Declination (Latitude of Body); t—Hour angle of body M; H—Altitude; EQ—Equator; N—Perpendicular let fall from Z' on PM; O—Intersection of N with PM; K—Distance from O to the equinoctial. *K always takes the sign of L.*

HAVING THUS COVERED BRIEFLY THE PROBLEM to be solved, we have available any of dozens of methods for actually solving the triangle. To name only a few: H.O. 214 being published by the Hydrographic Office, H.O. 211, H.O. 208, the Line of Position Book, and the Star Altitude Curves. The latter method is one of the shortest and gives a solution for position in about one minute.

In addition to the tabular methods, there are several mechanical computers, such as the Hagner Position Finder, the Willis Altitude and Azimuth Instrument, and the Sinitzin-White Navigation Computer.

In addition to the chosen method for solving the astronomical triangle, the following items of celestial navigation equipment are required: (1) an Aircraft Sextant, (2) a Navigation Watch, preferably one with the second-setting feature, (3) Nautical Almanac, and (4) means for plotting including Charts, Notebook and Plotter, Pencils, etc.

The method of solving the navigation triangle and the terms used are shown in Fig. 1. The altitude is found by the formula Cosec. H=Sec N Sec (K~d) in which N and K are taken directly from Table A.

We will now give the steps in the solution of the triangle for finding the computed altitude and azimuth followed by solution of a problem together with the plotted line of position, Fig. 2.

Extracts from Table A and Table B are shown in Fig. 3 and Fig. 4. A portion of Rust's Azimuth diagram is shown in Fig. 5 with brief directions for its use. Some of the details have been omitted from the problem as solved, although the beginner should be able to judge by it

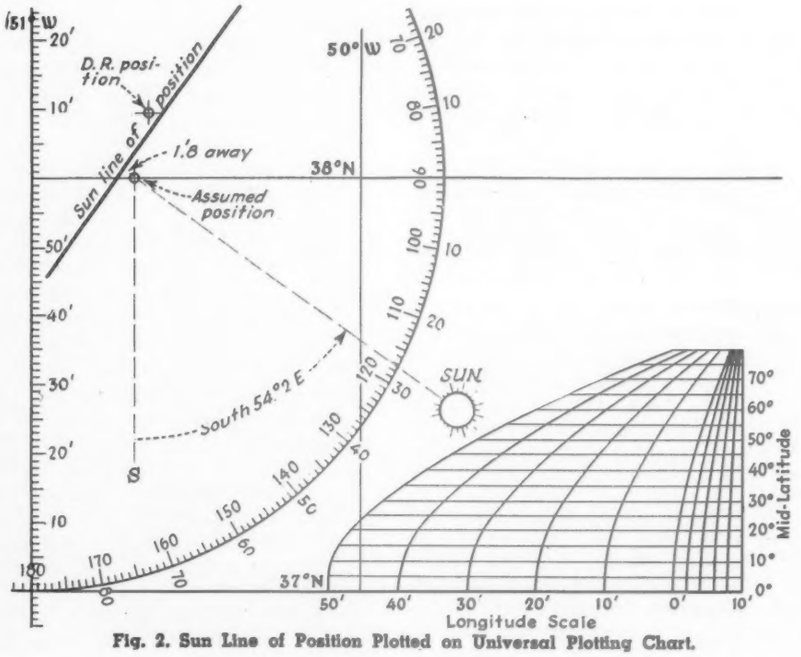


Fig. 2. Sun Line of Position Plotted on Universal Plotting Chart.

the amount of study and work required for accomplishing practical navigation.

In general, by using the best equipment and technique, a position may be determined in 3 to 5 minutes with an accuracy to within 5 miles. The equipment for this weighs about 15 pounds and costs about $500.00.

Method of Solution by Line of Position Book

For the Altitude Difference.

(1) Find the Greenwich Hour Angle (G.H.A.) in degrees. This is the long. of G.P. body from Almanac.

(2) Apply to the G.H.A. an assumed longitude (nearest D.R. long.), which will make the local hour angle (L.H.A. or "t") an integral number of degrees.

(3) Assume a latitude (integral degrees) nearest the D.R. latitude.

(4) Enter Table A with L.H.A. and with the assumed latitude and take out A and K. The H.A. is at the top, and L at left margin.

(5) Enter Table B with K⁓d and take out B. To find K⁓d, give K the sign of the latitude, and then combine K and the declination algebraically, i.e., the sums when signs are unlike, and the difference when the signs are alike.

(6) Enter Table B with A+B and take out the computed altitude; the degrees of altitude appearing at the bottom and the minutes of altitude at the right margin.

(7) The difference between the computed and the observed altitudes is the altitude difference (H_c⁓H_o=a); the altitude difference, "a", is measured from the assumed position toward the body when the H_o is greater than H_c, and away, when smaller. The line of position is at the distance, "a", from the assumed position and is laid off at right angles to the bearing of the body.

For the Azimuth:

(1) Enter left margin of Azimuth diagram fig. — with H.A., or with 180°–H.A., if H.A. is over 90°.

(2) Then follow the horizontal line to the declination curve.

(3) Then follow the vertical line to the altitude curve.

(4) Then follow the horizontal line to right margin and pick off Azimuth (Z).

For Naming the Azimuth:

(5) Give Z the name of the quadrant in which the body is found; for example, if body bears NW and Z is 80, Z = N80W, and Zn = 280.

Example: Given G.H.A. of sun 1°–41′.1W, declination 10°–05′.4S, and corrected altitude 23°–37′.2, required the sun line of position observer's D.R. position lat. 38°–09′.3N, long. 50°–38′.5 W.

TABLE A

H.A. / Lat.	48° (3h 12m) A	48° (3h 12m) K	49° (3h 16m) A	49° (3h 16m) K
0°	17449	0° 0.′0	18306	0° 0.′0
1	17440	1 29.7	18297	1 31.4
2	17416	2 59.2	18271	3 2.8
3	17376	4 28.7	18227	4 34.0
4	17319	5 58.0	18166	6 5.0
5	17246	7 26.9	18088	7 35.8
36	9740	47 21.3	10130	47 55.1
37	9429	48 23.8	9803	48 57.4
→ 38	9120	49 25.3	9478	49 58.8
39	8812	50 26.0	9155	50 59.2
40	8506	51 25.8	8834	51 58.8
61	3019	69 39.0	3121	70 1.0
62	2818	70 24.9	2913	70 46.2
63	2624	71 10.4	2712	71 31.0
64	2436	71 55.5	2518	72 15.4
65	2255	72 40.3	2330	72 59.4
Lat. / H.A.	A	180°—K	A	180°—K
	132° (8h 48m)		131° (8h 44m)	

Fig. 3. Extract from Table A line of position book.

TABLE B

K⁓d	66°	66°	69°	MIN. ALT
′				
0	30103	39069	44567	60
1	30125	39097	44600	59
2	30147	39125	44633	58
3	30169	39154	44666	57
→ 4	30191	39182	44699	56
5	30213	39211	44732	55
21	30566	39669	45265	39 ←
22	30588	39698	45298	38
23	30610	39727	45332	37
24	30632	39756	54365	36
25	30655	39785	45399	35
56	31352	40693	46456	4
57	31375	40723	40491	3
58	31397	40753	46525	2
59	31420	40782	46560	1
60	31443	40812	46595	0
	29°	23°	20°	MIN. ALT

ALTITUDE Hc

Fig. 4. Extract from Table B line of position book.

By
Lt. Comdr.
P. V. H. Weems
U. S. N. Retired

Solution: Sun Bearing Se.

GHA (degrees)	1–41.1 W		d	10°–05′.4 S
			corr	(—) 0.3
Long (assumed)	50–41.1 W		d	10–05.1 S
LHA	49° E	A 9478	K	49–58.8 N
Lat (assumed)	38° N	B 30191	K⁓d	60–03.9
		A+B 39669	H_c 23–39.0	
			H_o 23–37.2	
Z = S 54°2 E; Z_n = 125°.8 ♯.			a ♯	1.8 Away

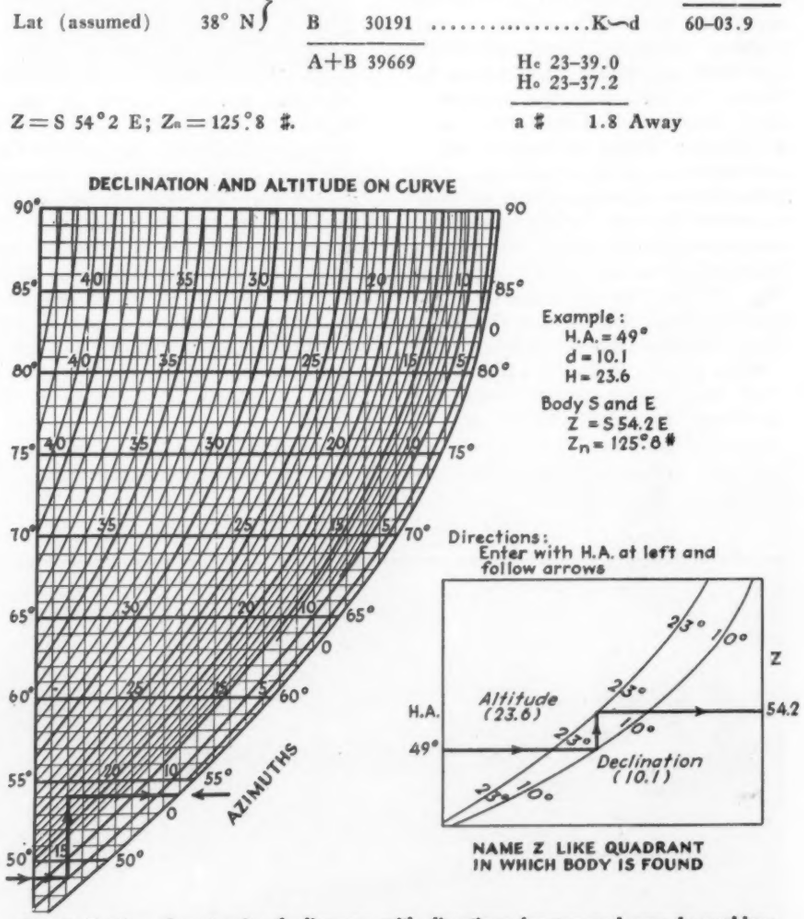
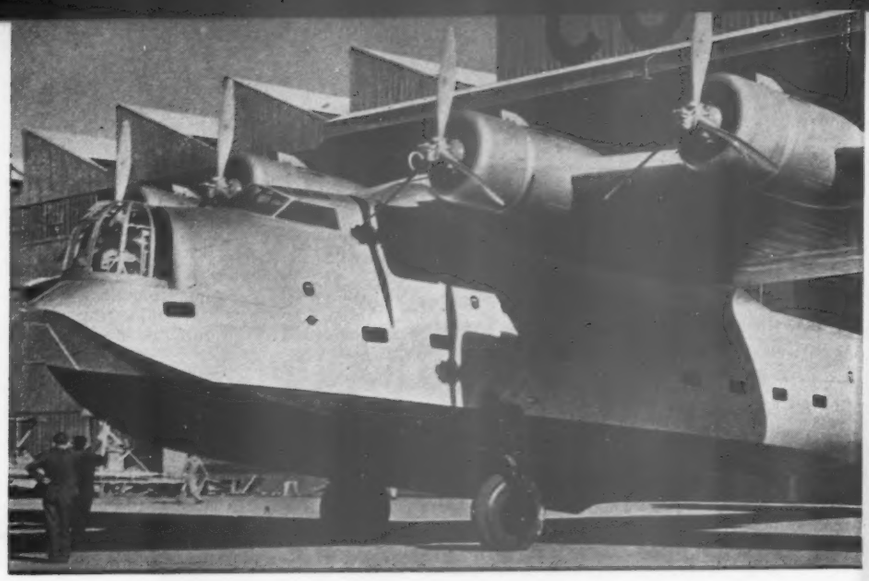


Fig. 5. Portion of rust azimuth diagram with directions for use and sample problem.



Consolidated flying boats have figured prominently in the many record-breaking mass flights whose stories are buried under the heading "routine transfers of equipment" in the Navy Department files. Latest Consolidated contribution to the Navy's aircraft fleet is the high performance XPB2Y-1 four-engined patrol bomber for long range operation.

Consolidated XPB2Y-1

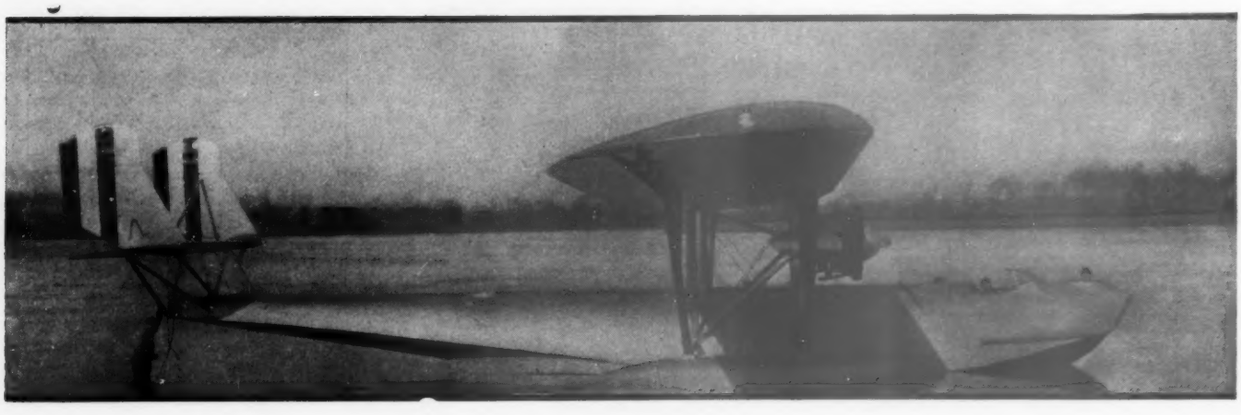
Navy's newest big boat unveiled

REVEALING LINES SO GRACEFUL as to belie its mammoth proportions, the Navy's newest experimental "flying dreadnaught" was unveiled at the plant of Consolidated Aircraft Corporation, San Diego, Cal., on Dec. 8. On this same day the Navy started a mass flight of fourteen Consolidated PBY-1 type twin-engine patrol boats from San Diego Bay which ended successfully the following day with the arrival of all fourteen planes in Panama after a record breaking 3,000 mile hop. This flight served to emphasize the importance of the new four engine patrol bomber to Navy policy, for the repeated flights of the PBY-1 boats during 1937 have demonstrated how rapidly the U. S. Navy is approaching its ideal of a "flying fleet" independent of surface crafts. With the advent of the new four engine patrol bombers as developed by Consolidated and by Sikorsky, the Navy has available the equipment from which to build an independent air fleet capable of operating to any part of the world without relying on auxiliary ship tenders. Certainly no other country in the world has carried the development of the fleet air arm so far as has our own American Navy. And while we cannot publish performance figures on the new Consolidated XPB2Y-1 it is obvious that while we have two such types competing for Navy favor and service contracts, no other country in the world possesses flying boats of this class.

The most advanced flying boat in existence anywhere else in the world are the Short "Empire" class commercial boats. But these are not only materially surpassed by the Consolidated and Sikorsky military patrol bombers, they are far exceeded in all-around size and performance by the new Martin Model 156 and the Boeing 314 commercial boats. With such a tradition of success in the development and operation of large flying boats already established, a tradition

Forerunner: The first XPY

1928



stemming from the NC boats of post-war days, there is reason to hope that our American business men and politicians will give the necessary support to our foreign over-ocean air transport lines to further consolidate the dominant position already occupied.

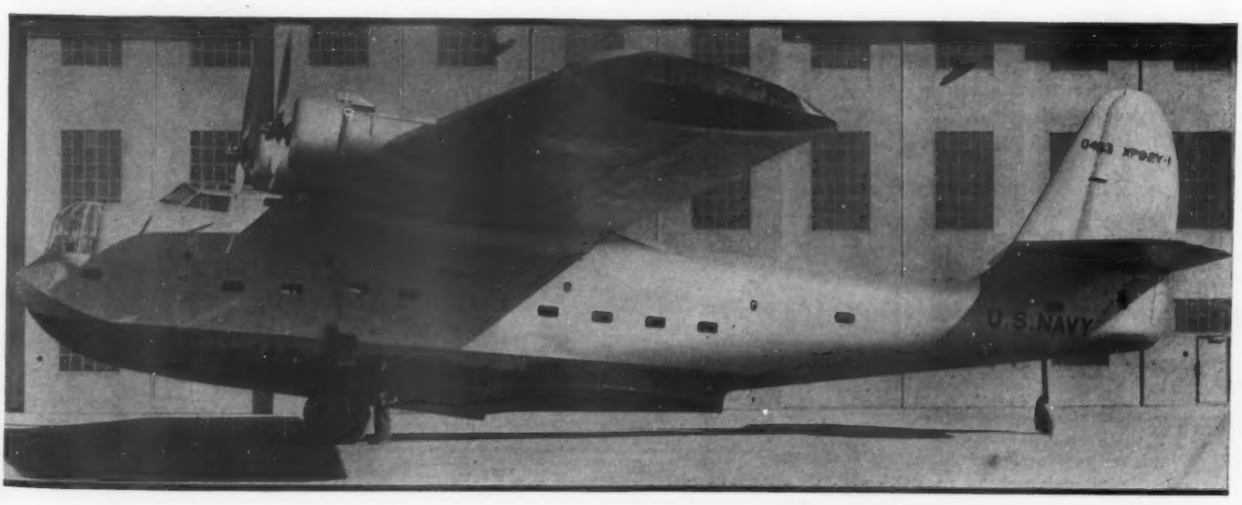
Above—Location of retractable navigation turret behind wing. Right—Details of the XPB2Y-1 tail.

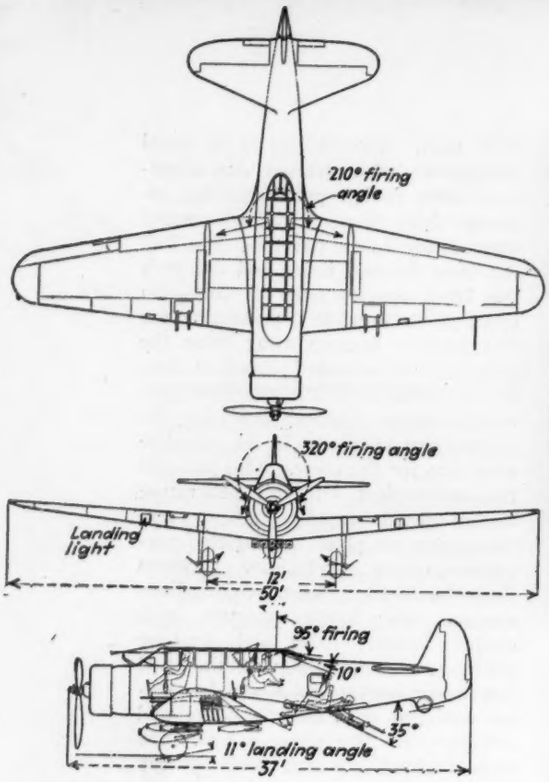
When the Sikorsky Navy patrol bomber was launched recently it was aptly dubbed the "flying dreadnaught". No better term could be applied to the Consolidated boat, which is a sister of the Sikorsky as to general size and arrangement. No official information on armament is available, but it is obvious that the Consolidated can stow tremendous bomb loads in her wings, giving her deadly striking power. Gun turrets front and rear provide ample defense against attack in the air. Guns of the "cannon" class will probably be mounted in order to outrange ordinary pursuit armament. This protection, plus the high speed of the ship, should make the new boat relatively invulnerable to attack in the air.

In general arrangement the Consolidated XPB2Y-1 is a four engined single hull monoplane flying boat, with the wing mounted directly on the hull and the engines carried in nacelles well forward of the leading edge. Retractable wing tip floats are provided, improving the speed of the plane in flight, for the wing is full cantilever, as are the tail surfaces, making this plane by a good margin the "cleanest" big flying boat aerodynamically that has yet been built. Construction is of metal throughout, with stressed skin aluminum alloy design predominating, although flaps, ailerons, and tail control surfaces are fabric covered. The hull has been finished inside and out with the latest developments in corrosion proof paints to make it practicable for this boat to operate away from the home base for extended periods of time. Exterior hull finish is in aluminum pigmented paint. Further provision for independent operation is the complete provision for the crew. This includes the independent 110 volt generating system which supplies AC current throughout the plane, a complete intercommunicating telephone system throughout the plane, commodious sleeping and living quarters with clothes lockers, toilet and washing facilities, soundproofing, heating and ventilating system, and a complete galley equipped with electric range and refrigerator. The plane is also fitted with beaching gear that can be quickly stowed in the interior of the fuselage, and with its own workshop for routine maintenance work in flight, or at rest away from the home base. It would appear that this ship could "keep right on going" so long as fuel is kept in the tanks. An important feature to successful long range navigation is the special navigation turret aft of the wing in the top of the hull.

Performance data have been withheld but it is obvious that the plane will show exceptional speed, and the range is rumored to be remarkable, even in this era of long range flying boats. After flight tests are made, probably during December, the boat will be flown to one of the United States Naval air stations for exhaustive service testing.

Ten years growth: The XPB2Y of 1938



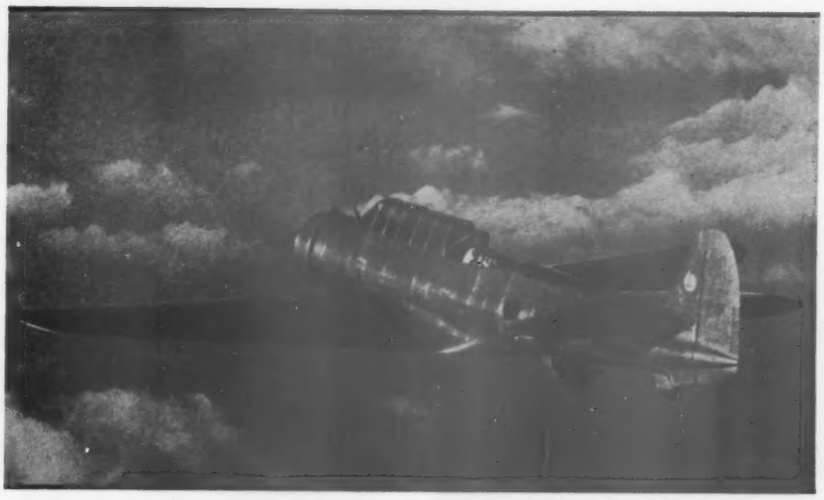


VULTEE Attack Bomber V-11GB

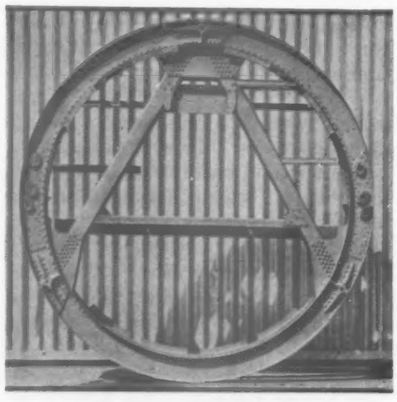
American military type wins wide favor in the foreign market.

AMERICAN SUPERIORITY in the field of design and manufacture of aircraft for the world market has been forcefully demonstrated in the wide popularity which has been won by the V-11GB attack bomber, manufactured by the Vultee Aircraft division of the Aviation Manufacturing Corporation. The Vultee factory is devoting its entire facilities to the manufacture of a single type plane for the foreign market.

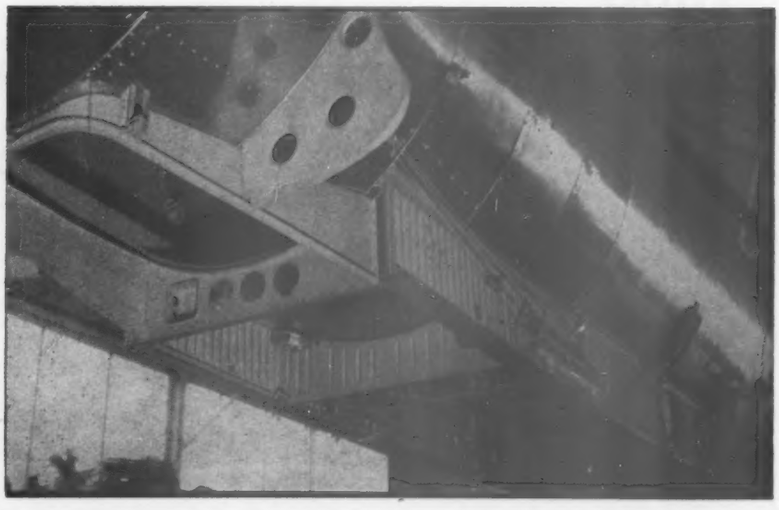
Incorporated in the design of the Vultee are the latest American developments of aluminum forming by extrusion, forging, casting and drop hammer stamping. Through a careful balance of these forming methods in the various parts of the plane, plus other allied developments in methods of riveting, bolting, and screwing parts together, it has been possible to build a more efficient airplane from a performance standpoint, and one more durable and serviceable than most current comparable foreign designs. From a maintenance standpoint the Vultee strikes us as a ship that will deliver more hours in the air and less in the shop than most any foreign equipment with which it might be compared.



Current orders for the Vultee attack bomber total an even one hundred planes which, with spares and equipment, represents a backlog of more than $6,000,000 on the books of Vultee Aircraft as of December 1, 1937. With planes now on order from Russia, China, Turkey and Brazil it has been necessary to expand plant facilities and payroll. When the production commenced in 1932 on the V-1 single engine transport there were 30 people employed and operations were conducted in a single hangar on Grand Central Air Terminal, Glendale. But now production is carried on in a modern aircraft factory located on the



Main bulkhead ring



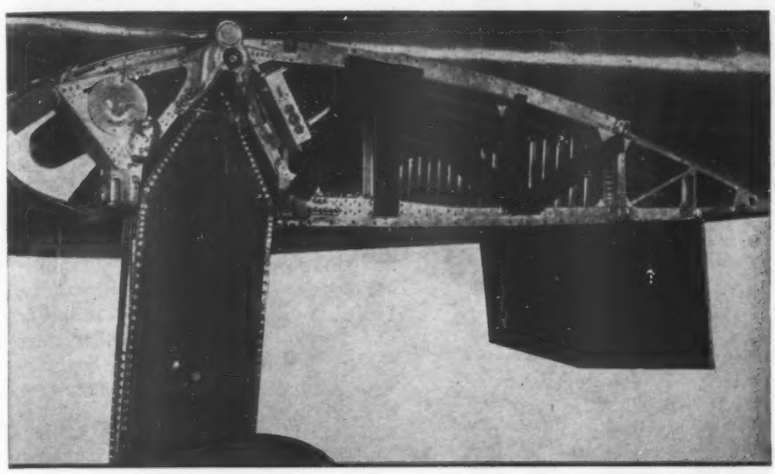
Skids built into underpart of fuselage take shocks of accidental "wheels-up" landings

firm's own eighty-acre flying field near Downey, California. With completion of a recent $200,000 expansion program, the plant covers 125,000 square feet of floor space, measures overall 660 ft. by 300 ft. In this plant fifteen hundred employees work two full shifts a day producing a plane per week at the present time.

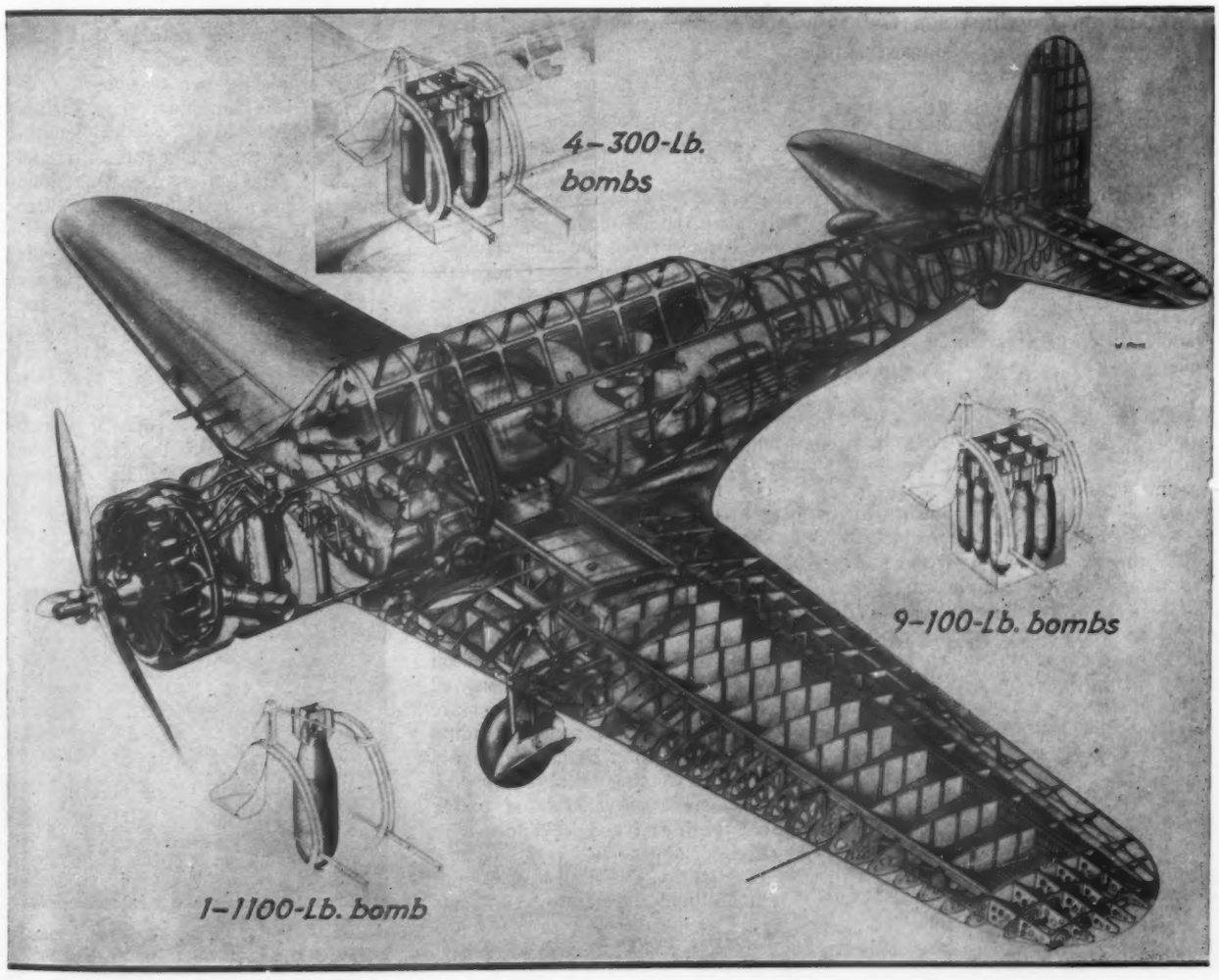
As a military weapon the Vultee is equally adaptable to use as an attack plane, light bomber, or reconaissance and photographic missions, and may also be used as an ambulance plane. Provision is made for mounting four fixed guns firing forward and two rear flexible mounted guns. Bomb loads are variable to include twenty thirty pound bombs, nine one hundred pounders, four of three hundred pounds, or one eleven hundred pound bomb. Performance with the Wright Cyclone GR-1820-G2 engine of 850 hp. and Hamilton-Standard constant speed propeller includes a top speed of 237 m.p.h., maximum range with military load of 2,380 miles.

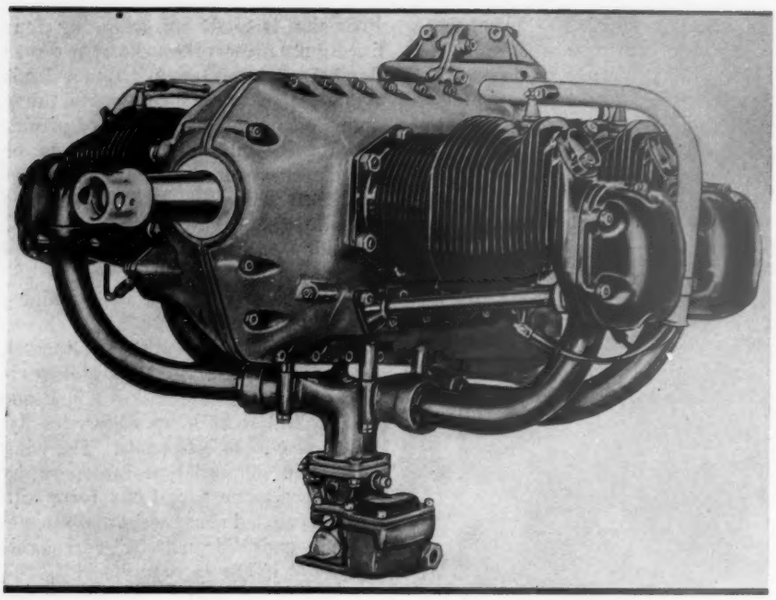
Structurally the Vultee is all-metal, mainly of Alclad sheet. Fuselage is circular in cross-section, of monocoque design, and is built up mainly of flat sheets riveted to bulkheads. The wing is of skin stressed type incorporating a modified monospar of box form with two corrugated shear webs and top and bottom caps formed by corrugated

(*Turn to page 71*)



Left: Detail of landing gear attachment and wing connection. Flap is hanging with disconnected controls.





Continental A-50

N. N. Tilley, Continental's Chief Engineer, presents details of new 50-hp. lightplane engine

FIRST ANSWER TO THE DEMAND FOR MORE POWER in the light airplane comes from Continental Motors whose A-40 engines have powered a large percentage of the low prices airplanes built to date. The new offering is the A-50 model in three series. Series 1 has one Scintilla magneto, a pressure oil pump and tachometer drive. It is of the dry sump type with scavenging by gravity. To fulfill export requirements a second magneto is added to the Series 1 engine which makes it the Series 3. Battery ignition and more complete accessory equipment are characteristics of the Series 2 variation. Equipment for this series includes dual Auto-Lite or Scintiila ignition, drives for Eclipse starter and Eclipse or Auto-Lite generator, scavenge and pressure oil pumps, and A.C. automotive fuel pump, radio shielding, and tachometer drive. Rating is 50 hp. at 1,900 r.p.m.

The increase in power has been obtained for virtually the same weight as the A-40 engine. Fuel consumption at rated power is 4½ gal. per hr. but this is reduced to 2¾ gal. per hr. at 85 percent level flight r.p.m. Oil consumption is less than one pint per hr. Complete sealing is provided against oil leakage and fumes.

Each cylinder has a single rocker box enclosing the two overhead Jadson valves which are located in the lengthwise plane of the engine. The rocker box cover is a light die casting fastened to the cylinder with six studs and nuts. Ample area of cooling fins on exhaust port combustion chamber and spark plug bosses insure adequate cooling. Air jackets, baffles or cowls are required to insure cross flow of air over cylinder head between valve ports. Cooling tests indicate little difficulty in holding maximum head temperatures below 400 deg. F. and cylinder base temperatures below 200 deg. F. and 75 deg. F. cooling air.

The finned forged steel cylinder barrels are screwed and shrunk into the heat treated Alcoa cast aluminum alloy head, valve seat inserts and spark plug bushings are of aluminum bronze, and valve guides are bronze. The combustion chamber is of valve-in-head type with the two Jadson valves in the flattened narrowed crown of the dome. Spark plugs are between the valves in pents extending into the combustion chamber to avoid possible oil fouling from the piston. Each valve is operated by a rocker arm, a push rod and a Wilcox-Rich hydraulic tappet—all enclosed and sealed against external oil leakage. Engine oil under pressure is circulated into the tappet through the push rod and rocker arm to the rocker arm bushing and to the valve tip. Splash wets the valve stem and guide. Oil is returned to the crankcase via push rod housings. The cylindrical steel tappet has a flat faced, hardened end that bears directly on the cam.

The camshaft is cast of Proferall by Campbell-Wyant and Cannon and has hardened cams and journals. There are six cams, three journals and an overhung eccentric at the propeller end to operate the fuel pump. At the rear end is a flange to which a gear is attached by capscrews.

The forged alloy steel, one piece, four throw crankshaft is supported by steel-backed cadimum main bearings at the center and both ends. The crankshaft is drilled for lightness and to provide pressure oil lubrication of crank pins. Plain thrust faces are formed on the propeller and throw and on a shoulder near the propeller so that these engines can be used for either tractor or pusher installations. The propeller drive end conforms with No. "O" taper S.A.E. Aeronautic Standards. On the opposite end of the crankshaft is a flange to which is fastened, by capscrews, a spur gear to drive the camshaft and accessories.

The crankcase is a two-piece, heat-treated Alcoa aluminum alloy casting bolted together at the vertical lengthwise plane through crankshaft and camshaft. Rigid transverse webs hold the three main bearings and the three camshaft journals. A Chicago rawhide seal prevents oil leakage at the propeller. The large tappet guides are formed in the crankcase in a plane below and parallel to the cylinders. Cast-in lengthwise tubes lead oil under pressure to the tappet guides, the camshaft and the main bearings. Four engine mount bosses for ⅜ inch bolts are provided at the rear of the crankcase as in radial engines.

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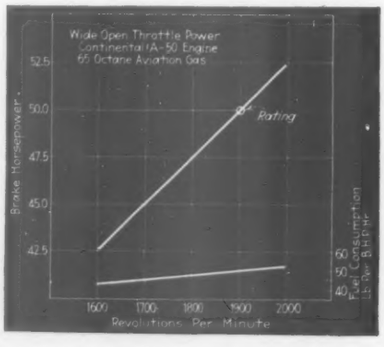

Power curve of A-50 using 65 octane fuel.

I am NC 18111...
I am proud of my heritage. In 1924 my forebears were first to fly around the world. Others pioneered air mail routes. I have some 1900 relations making fame for my family name, mostly in government service. In 1934 the first of my kind was born. Now 400 of us are standard equipment on airlines throughout the world.
Shades of my globe-flying grandparents... we fly more than 4 times around the world every day! I was built in the world's largest aircraft factory, where one of my kind is born every working day. I am a Douglas DC-3 Air Transport. Fly with me and share my pride in my heritage.
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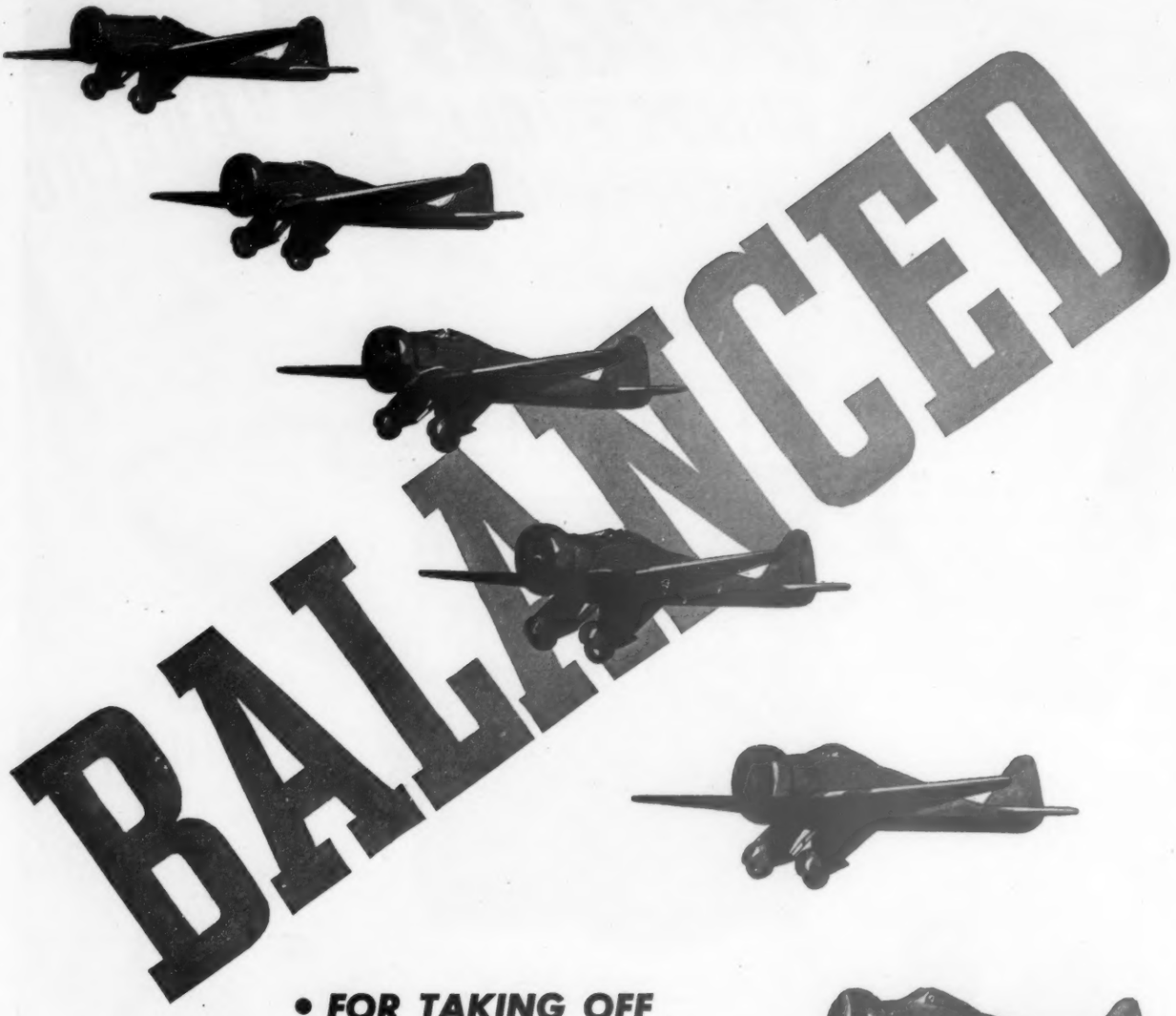
DOUGLAS
Standard Air Transports



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For complete information on any of Shell's line of aircraft petroleum products, write to the Shell Aviation Department, Shell Building, San Francisco, California; or Shell Building, St. Louis; or 50 West 50th Street, New York City.

SHELL

AVIATION GASOLINES

Flying Equipment

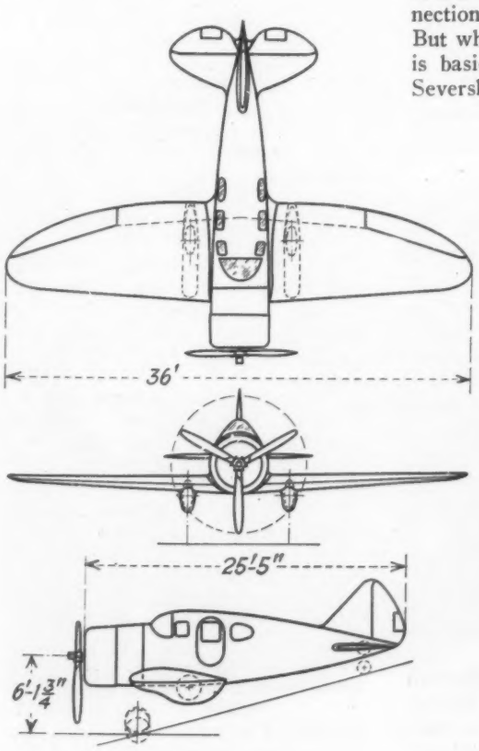
A New SEVERSKY for the EXECUTIVE

Fuller's Bendix winner and Jimmy Doolittle's new job open up new possibilities for the fast moving business man.

DRAMATICALLY EMPHASIZING the recent progress of American aviation, the Seversky Aircraft Corporation has offered a commercial version of the Seversky plane with which Frank W. Fuller, Jr. won the 1937 Bendix race. As indicated in last month's issue, Jimmy Doolittle has just taken delivery on one to speed up Shell's business. Designed as a three place cabin plane, the commercial Seversky is known as the "Executive" model and is rated at 340 m.p.h. at 18,000 ft. altitude using the Pratt & Whitney twin-row Wasp engine of 1200 h.p. At this point we find it necessary to pause and ponder for a moment the spectacle of our leading executives dashing about the country at 340 m.p.h., or at a cruising speed of 310 m.p.h., which is just about 120 m.p.h. faster than our scheduled air transport. It is a little startling, especially in connection with a range of 2,790 miles. But when one considers that the plane is basically of the same type as the Severskys which have seen thousands of hours of service with the United States Army Air Corps it becomes apparent that the practical 340 m.p.h. private airplane is really here. Although the Seversky "Executive" is not a plane for the novice, it should certainly be thoroughly practical and reliable in the hands of the average experienced pilot. In the Bendix race Frank Fuller, himself an amateur pilot, though of long experience, raced against a number of seasoned race pilots flying special racing equipment, and he not only won the race, but established a new Bendix record both for the race from Los Angeles to Cleveland, and for the full transcontinental distance. In structure and aerodynamic form the Seversky "Executive" closely follows previous models, of all-metal construction with skin stressed wing, monocoque fuselage, retractable landing gear and split type trailing edge flaps.

Specifications supplied by the manufacturer are as follows:

Wing span	36 ft.
Overall length	25 ft. 6 in.
Overall height	9 ft. 10 in.
Wing area	220 sq. ft.
Empty weight	4,250 lbs.
Useful load	2,503 lbs.
Gross weight	6,753 lbs.
Fuel capacity	450 gals.
Oil capacity	18 gals.
Powerplant	Pratt & Whitney twin-Wasp, 1,200 h.p.
Maximum speed (18,000 ft.)	340 m.p.h.
Cruising speed	310 m.p.h.
Rate of climb	4,000 ft. per minute
Service ceiling	32,000 ft.
Absolute ceiling	35,000 ft.
Cruising range	2,790 miles
Most economical cruising range	3,000 miles



Doolittle will have to do a great deal when he flies his new Seversky Executive. A worm's-eye view of the cockpit.

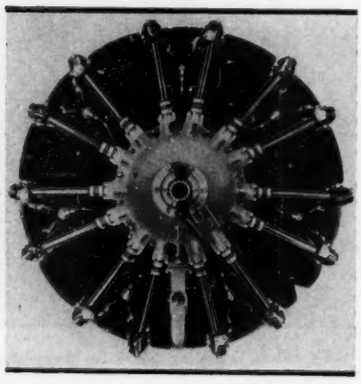
Flying Equipment

Seven-Cylinder LYCOMING

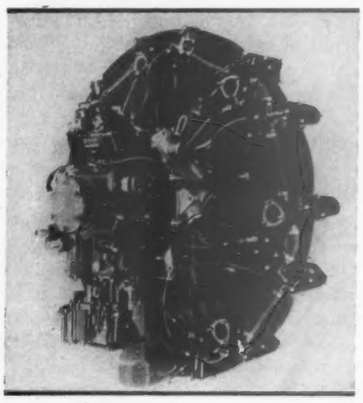
New R-530-D series supplements established line of nine-cylinder engines.

LYCOMING ENGINES enter a new field with the announcement of the new seven-cylinder R-530-D series engines by the Lycoming Division of Aviation Manufacturing Corporation. Based on the proved features of the well known Lycoming R-680 nine-cylinder engines, the new seven-cylinder models are rated at 210-220 hp. for take-off, and 190-200 normal maximum horse power.

Design features of the new seven-cylinder series are based on the service experience with the R-680 engines, and the record of more than one hundred million miles of flight with various models of nine-cylinder Lycoming engines. Incorporated in the R-530-D series are the same features recently approved on the nine-cylinder engines, notably; completely automatic valve gear lubrication, greatly increased cylinder finning, and provisions for standard accessory drive equipment. Valve gear lubrication is accomplished by pressure engine oil metered through the cam followers and push rods to the rocker arm bearings. The return oil drains through the push rod housings and external oil lines connecting adjacent rocker boxes, to the engine oil sump. Particular care has been taken in the design to assure complete drainage of each rocker box during engine idling periods on the ground and when the engine is stopped. New enclosed rocker boxes are made oil tight by using gaskets and covers secured to each rocker box by four studs and nuts. The one-piece construction of push-rod housings, sealed in the rocker boxes with a rubber sleeve and at the crankcase with special rubber hose and clamps, prevents oil leakage at these points. Complete elimination of manual lubrication permits these engines to operate for periods of one hundred hours without maintenance attention.



A view of the propeller end.



Accessory equipment of the R-530-D Series

Cylinder cooling is improved through use of longer fins more closely spaced. This, together with new, closely fitted cylinder air baffles and rear exhaust ports, permits operation at considerably lower engine temperatures and with more uniform cylinder cooling under all operating conditions. Additional cooling as well as greater strength is also provided through use of a new ribbed piston.

Standard equipment of the Lycoming R-530-D series engines includes the following accessory drives, which are grouped on the rear crankcase section so as to provide maximum accessibility; one dual type magneto, starter, generator or fuel pump, and tachometer drive connection. The SAE No. 20 crankshaft end permits installation of fixed or Lycoming mechanically operated controllable propeller. Other equipment furnished with each engine includes: Stromberg NA-R7A single-barrel carburetor, pressure type cylinder baffles, booster coil connection to the left distributor, fuel priming connections to top three cylinders, propeller attaching parts, engine tool kit, and engine operator's manual. Individual type radio shielding and dual tachometer drive are available as special equipment.

Specifications

Important specifications for the Lycoming R-530-D series are:

Model designation	R-530-D2 . . R-530-D1
Type—Direct drive, single row, radial, air cooled	
Number of cylinders	seven . . . . seven
Bore	4⅜ in. . . . . 4⅜ in.
Stroke	4½ in. . . . . 4½ in.
Piston displacement—	529.2 cu. in. . . . . 529.2 cu. in.
A.T.C. Number—	183 182
Compression ratio—	5.5 to 1 . . . . 6.5 to 1
Rated speed for take-off with controllable propeller—	2300 rpm . . . . 2300 rpm
Rated normal speed—	2100 rpm . . . . 2100 rpm
Rate horsepower for take-off with controllable propeller—	210 hp. . . . . 220 hp.
Rate normal horsepower—	190 200
Fuel required—minimum octane no.—	73 80
Fuel consumption, max. at cruising—	0.52 lbs./BHP/Hr. . . . . 0.52 lbs./BHP/Hr.
Propeller shaft end—splined type—	#20 SAE . . . . #20 SAE
Overall diameter of engine—	43.50 in. . . . . 43.50 in.
Overall length of engine—	34.26 in. . . . . 34.26 in.
Average weight, complete—	425.0 lb. . . . . 425.0 lb.
Weight of optional equipment:	
Radio shielding—	5.05 lb. . . . . 5.05 lb.
Generator drive—	1.61 lb. . . . . 1.61 lb.
Fuel pump drive—	1.62 lb. . . . . 1.62 lb.
Dual tachometer—	2.45 lb. . . . . 2.45 lb.
Diameter of mounting bolt circle—	19¼ in. . . . . 19¼ in.
Number of mounting bolts—	six . . . . six
Size of mounting bolts—	⅜ in. . . . . ⅜ in.

A RECORD YEAR *for* WRIGHT

The Wright Aeronautical Corporation has just completed the largest year in its history. During 1937 nearly 2600 Wright Cyclones and Whirlwinds were sold — and deliveries were increased approximately 50% over 1936.

Wright takes this opportunity to thank all who contributed so generously in making this record possible —the U. S. Army Air Corps, the U. S. Navy Department, commercial and military aircraft manufacturers, commercial airlines of the United States and abroad, and private owners of Wright-powered aircraft.

The U. S. Army Air Corps alone purchased over 1200 Wright engines during 1937. Wright Cyclones power all of the latest Boeing four-engined Army Bombers, Douglas twin-engined Army Bombers, Curtiss twin-engined Army Attack Planes, North American Army Observation Planes and Grumman F3F-2 Navy Fighters; also Martin Export Bombers, Curtiss Hawk 75 Pursuit Planes, Vultee Attack Bombing Planes and many other types of military aircraft.

In the commercial field, all of the luxurious Douglas DC-2 and DC-3 Day Planes and Sleeper Planes now in service on American Airlines, Braniff Airways, Eastern Air Lines, Transcontinental & Western Air, Pan-American Airways System, KLM (Royal Dutch Airlines), Swiss Air Lines, Australian National Airways and many other leading airlines throughout the world *are powered by Wright Cyclones.*

"Fly With Wright the World Over"

WRIGHT

AERONAUTICAL CORPORATION

PATERSON NEW JERSEY

A DIVISION OF CURTISS-WRIGHT CORPORATION

Aircraft CAREERS in the making

AT AMERICA'S FINEST EQUIPPED AIRCRAFT TRAINING INSTITUTION

Only at

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can you have all these outstanding advantages--

■ **Industry Supervision**—Executive Board members are internationally known aircraft engineers and executives. They personally supervised preparation of courses, selection of shop equipment, layout of buildings, and take an active hand in the Institute's operation.

■ **Exclusive Courses**—The lessons used for both the resident course and the home study portion of the home-and-shop course contain material never before released by the industry. Exactly what is required of an employee in an aircraft plant is provided by the courses.

■ **Vast Shop Equipment**—Virtually a complete aircraft plant is duplicated in the 20,000 square foot shop training building. It houses the most extensive group of standard and advanced production equipment ever provided for student instruction.

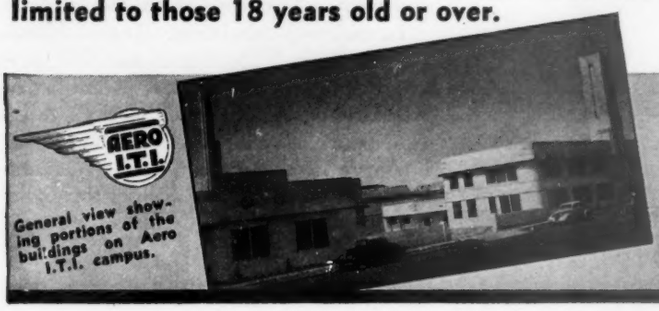
■ **Nationally Recognized**—Aero I.T.I. has been acclaimed by civic, industrial and vocational leaders, editors, press services and leading journals because of the unusual opportunity it offers men anxious to enter the aircraft industry—with a background of training unmatched by its thoroughness.

■ **Four New Buildings**—on the Aero I.T.I. campus are the most modern that can be built. Each is expressly designed to serve a specific purpose in the training program—they meet the California State Board of Education building requirements.

EXECUTIVE BOARD

John K. Northrop	C. A. Van Dusen	Robert E. Gross
President, The Northrop Corporation	Vice-President, Consolidated Aircraft Corp.	President, Lockheed Aircraft Corporation

If you want to enter this industry, that has grown from a quiet infant to a mighty giant in a few short years—if you want a career in this new field of opportunity—if you want to enter it equipped to be of real service to your employer—get full details on the special advantages offered by Aero I.T.I. New booklet "More Planes" explains. Use coupon. Offer limited to those 18 years old or over.



General view showing portions of the buildings on Aero I.T.I. campus.

AERO INDUSTRIES TECHNICAL INSTITUTE
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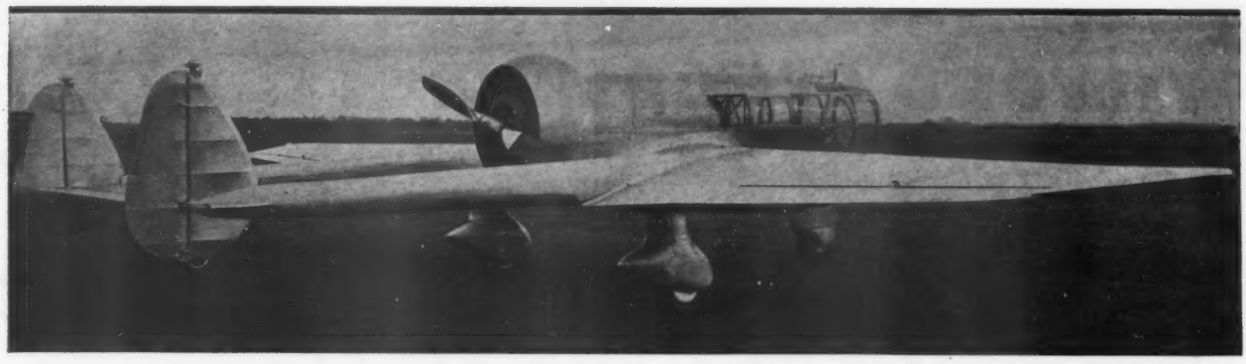


The Explorer

New ship designed specifically for aerial photography and mapping

FOR MANY YEARS aerial survey work has been done with equipment designed originally for some other purpose. A long time ago Talbert Abrams, (Abrams Aerial Surveys) got the idea of designing a ship especially for the purpose and ten months ago actual construction was started on "The Explorer" which was flown for the first time late in November. Among the features are exceptional forward and downward vision, rapid climb to high altitudes, high cruising speed, stability, fuel capacity for at least eight hours, supercharged engine, and an oxygen supply for the crew.

Fulfillment of the visibility requirement demanded a pilot's position in the nose. A pusher propeller and outrigger tail naturally followed and safety on the ground indicated the three wheel undercarriage. Vision is also enhanced by the sharp sweepback of the wing. Efficiency is increased by the carefully streamlined form of the gondola and the N.A.C.A. cowling.

Gondola construction is of welded steel tubing with stressed aluminum alloy skin. The wing is a full cantilever, of mono-spar steel tube construction. Monocoque dural construction is used for the booms.

The gondola is so close to the ground that no steps are required to enter. One door is provided on each side opening directly into the pilot's or camera man's seat. A "door within the door" permits the camera man to take photographs at an oblique and forward angle without opening the outer door. A hermetically sealed mapping porthole is built into the floor of the gondola. Airtightness of the cabin for supercharging is provided by sealing in the safety glass which serves as windows and as the outside covering of the gondolas.

The first of these ships is powered with the Wright J-6-9 E, 330 hp. engine with adjustable pitch propeller. Provision has been made for installation of a 450 hp. engine. Subsequent models will be designed for engines up to 1,000 hp.

Development and manufacture of this airplane is to be undertaken by the newly formed Abrams Air Craft Corp. of Lansing, Mich., of which Talbert Abrams is president, Kenneth Ronan is chief engineer, and Walter Carr is test pilot.

Areas

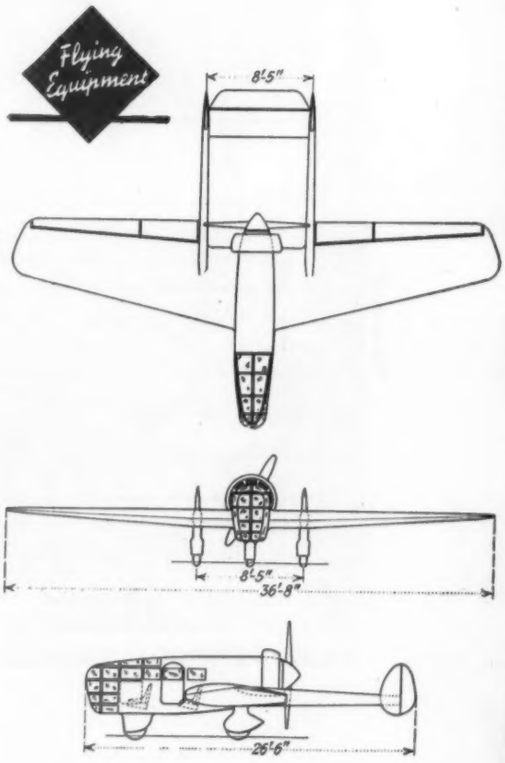
Wings	191	sq.ft.
Ailerons	18.4	" "
Flaps	12.74	" "
Stabilizers	20.7	" "
Elevators	9.3	" "
Fin	7.66	" "
Rudder	6.86	" "

Weights

Gross	3400 lb.
Empty	2100 "
Useful	1300 "
Equipment	120 "
Gas and Oil	800 "
Crew	380 "

Performance

Maximum Speed (Sea Level)	185 m.p.h.
Cruising Speed	2000 r.p.m. 150 m.p.h.
Landing Speed	60 m.p.h.
Rate of Climb	1300 ft. per minute
Service Ceiling	19,000 ft.
Cruising Range	1200 miles



A study of the principles of the

WILFORD GYROPLANE

as applied to a thoroughly modern design for a conventional airplane.

By Elliot Daland

Pennsylvania Aircraft Syndicate, Ltd.

PRACTICALLY ALL AIRCRAFT today are designed for a specific and definite purpose. It is obviously unfair, therefore, to condemn out of hand any one type in favor of another, for there are certain services for which one type is better fitted than for others. The data presented in this article have been compiled primarily to furnish light on the service possibilities of a thoroughly unconventional type, to throw some light on how the Gyroplane [a rotating wing aircraft with rigid, feathering blades as contrasted to the rotor types with freely hinged blades under the Cierva Autogyro patents—Ed] compares with the conventional airplane from the point of view of ultimate performance.

As the basis for the study the Curtiss Wright 19R monoplane was selected as representing a production machine of thoroughly modern design and construction with exceptionally good performance. Keeping the same fuselage, landing gear, tail surfaces and power plant (420 hp.) and the same gross weight (3,400 lb.) three modifications of the original machine were considered, as follows:

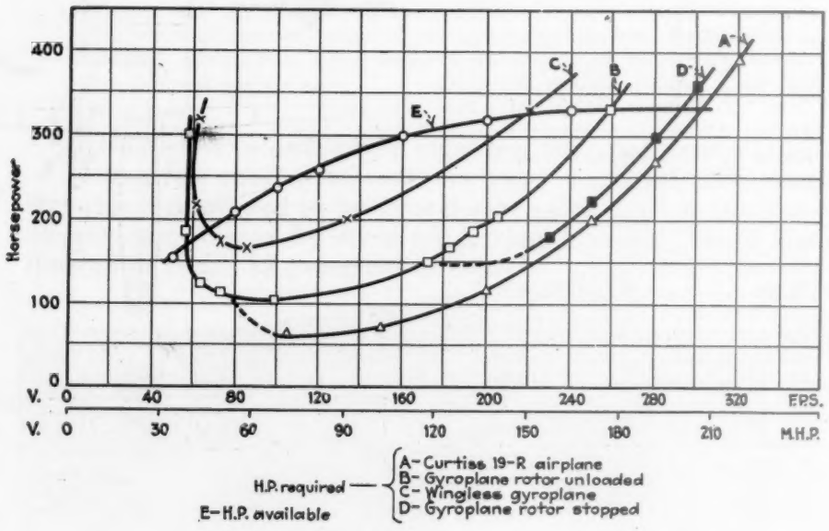
Case 1. The machine converted to a standard Wilford Gyroplane with rigid, feathering rotor. Swept area of the rotor, 1,135 sq.ft. with fixed wing area reduced from the original 174 sq.ft. to 154 sq.ft. Angle between the wing and the rotor such that the rotor is entirely unloaded at an air speed of 150 m.p.h. The entire weight of the aircraft is carried on the fixed wing but the rotor continues to turn at idling speed.

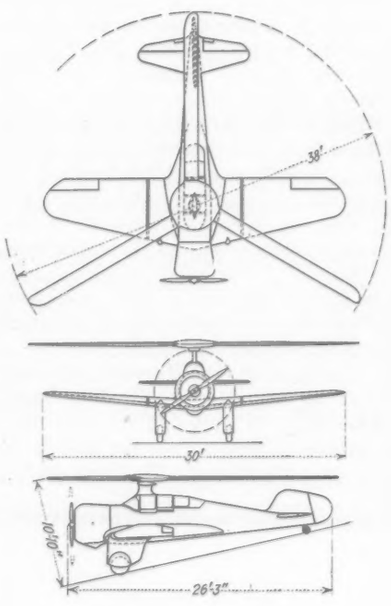
Case 2. Conversion to a wingless type gyroplane with the same feathering rotor (sweeping 1,135 sq.ft.), the rotor designed to carry all the load at all speeds.

Case 3. Conversion as in Case 1 to a gyroplane with fixed wing but incorporating arrangements so that the rotor may be stopped in flight.

Performance characteristics for the original airplane and for the three modifications have been calculated and are presented in the accompanying table. Basic assumption for all calculations is that the weight of the ship is carried by the resultant force on the wing or rotor and that the resultant velocities are divided into horizontal and vertical components. The power required curves are shown on the chart. Curve *A* is for the basic airplane; Curves *B*, *C* and *D* are for Cases 1, 2 and 3 respectively.

Type	High Speed M.P.H.	α Landing Deg.	Landing Speed Components Vert.	Horiz.	Speed Range of Horiz. V
A. Airplane	206.2	13°	10.9	60.3	3.42
B. Case 1					
Gyroplane	176.0	20°	10.81	29.7	5.92
Rotor Unloaded		30°	12.55	21.75	8.09
C. Case 2					
Wingless	148.6	20°	11.62	32.0	4.64
Gyroplane		30°	13.1	22.72	6.54
D. Case 3					
Gyroplane	199.8	20°	10.81	29.7	6.72
Rotor Stopped		30°	12.55	21.75	9.18





SIKORSKYS

join the Army

Adding range and scope to the United States Army Air Corps' complement of dual-purpose aircraft, five giant S43 amphibions have now been delivered. Important roles in defense are being assigned to these versatile Sikorskys. Equipped with Pratt & Whitney Hornet engines and Hamilton Standard propellers, the S43 is an *all-United product.*

S I K O R S K Y

DIVISION OF UNITED AIRCRAFT CORPORATION, BRIDGEPORT, CONNECTICUT

Hamilton Standard Presents

another outstanding propeller achievement . . . the HYDROMATIC full feathering—constant speed Propeller.

Already in quantity production* for the United States Army Air Corps, American Airlines, Pan American Airways, TWA, and United Air Lines, the HYDROMATIC is a worthy successor to earlier Hamilton Standard achievements—the Controllable Pitch and Constant Speed Propellers.

Hamilton Standard Propellers

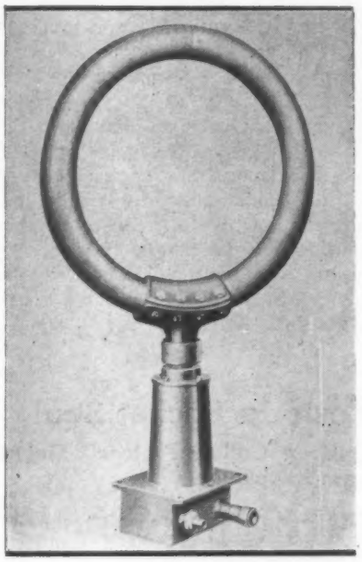
East Hartford, Connecticut

Division of United Aircraft Corporation

* *Restricted to use in the United States for the present.*

Aircraft Radio

New Equipment for Communication and Navigation by Henney and Fink



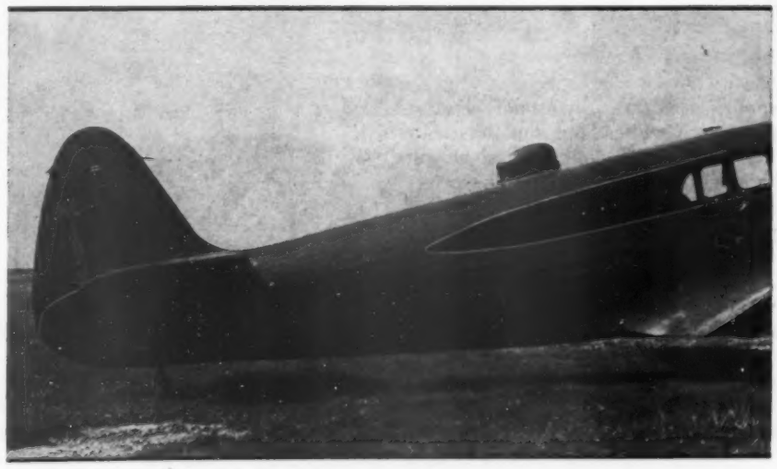
Western Electric Offers Rotatable Loop

THE WESTERN ELECTRIC COMPANY announce a new shielded loop antenna for aircraft, rotatable by means of a remote control unit. Designed primarily for use with the Western Electric 14 and 20 type receivers, the new loop is also applicable to other types. The aural null direction finder enables taking of radio bearings by rotating the loop. Position of the loop is indicated at the control unit by a needle on a scale, permitting accurate loop adjustment.

Fairchild Direction Finder With Streamlined Loop

FAIRCHILD AERIAL CAMERA CORPORATION, pioneer aircraft radio compass builders, have announced an improved model designated as the Fairchild RC-4 Radio Compass. Of special note is the much smaller shielded loop antenna, completely enclosed in a streamlined housing. The complete loop assembly with housing weighs six pounds less than the loop assembly alone as formerly used. The loop rotator mechanism is simpler, smaller and lighter in weight, with a remote control head which can be mounted on the instrument board, or wherever is most convenient for the operator. The degrees of rotation show directly on a dial on the remote control head. A 15-tube receiver replaces the 8-tube unit used in preceding models without any weight increase. The new receiver has a reception range of 300-400 miles over a continuous frequency range of from 170 to 1200 Kc. in two bands, plus greater selectivity and sensitivity. Through circuit improvements a high degree of indicator needle stability has been secured, regardless of voice or signal modulations.

The complete Fairchild RC-4 Radio Compass includes: 15-tube superheterodyne radio receiver with shockproof mounting; Loop antenna in streamlined housing; remote loop rotator and dial; remote control box; compass indicator dial; dynamotor; and complete set of connecting cables and junction box. When desired the set may be furnished with fixed loop. All features of previous Fairchild radio compass models have been retained, such as: 1. Provision for continuous visual indication of heading simultaneous with aural reception through earphones. 2. High sensitivity which permits visual indication on a distant station inaudible to operator on the earphones, or when static conditions make aural signals indistinguishable. 3. Complete operation from the pilot's seat by means of remote control 4. Operates on either commercial broadcasting stations or established airway radio stations.



Installation of the Fairchild Compass. (A) Indicator. (B) Receiver. (C) Loop Rotator. The loop housing is shown in the lower photograph.

FCC assigns ultra-high aircraft frequencies

THE RECENT ACTION of the Federal Communications Commission in assigning frequencies in the ultra-high spectrum has provided aviation radio with badly needed new territory in the ether. The new allocation, which resulted from the hearings held in June, 1936, assigns a total of 1278 channels in the region between 30 Mc. (10

(*Turn to page* 49)

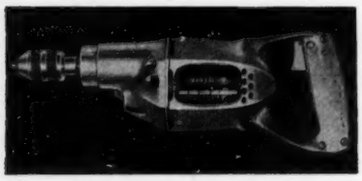
Buyers' Log Book

What's New in Accessories, Materials, Supplies, and Equipment

Low Speed Drill

Black & Decker unit developed for stainless steel

WITH THE WIDER APPLICATION OF STAINLESS STEELS to aircraft use, there is particular interest in the new low speed hand drill offered by Black & Decker. This unit has a capacity of ¼ in., standard full load speed of 285 rpm. net weight of 6¼ lb., and overall length of 13 in. The drill works from standard voltages. For drilling in hard metals a slow speed bit is essential, making the new Black & Decker tool a real contribution to efficient hand work.—AVIATION, *January, 1938.*



Black & Decker Slow Speed Hand Drill

Cuts Snow Glare

Adhesive liquid can be applied to window glass

NOW THAT THE LONG WINTER MONTHS are upon us there is reason to fear that snowblindness may strike down many of our best people. It is well known that during winter months excessive glare is experienced in buildings adjacent to open fields where large expanses of snow are present. Such a condition exists on many northern airports each winter, and doubtless many field attendants lounging about the hangars have suffered from such glare. But this need be so no longer as Snopake has been developed by the Skybryte Company of Cleveland, Ohio. Applied to the inside or outside of windows, Snopake is a pale green adhesive liquid which admits over ninety per cent of the light but reduces it to a soft mellow diffused practically harmless illumination. Snopake will remain on the glass until removed with hot water and a stiff bristle brush.—AVIATION, *January, 1938.*

Protectoid in Aeronautics

Celluloid product finds novel application in visualizing weather

A NEW USE for Protectoid, thermoplastic transparent material manufactured by the Celluloid Corporation, 10 East 40th St., New York, has been found useful by the U. S. Weather Bureau. By using successive layers of Protectoid over a weather map, charting air currents at as many as ten different layers, pilots and airline operating personnel find a new aid in visualizing the weather.

"Soft" Mallet

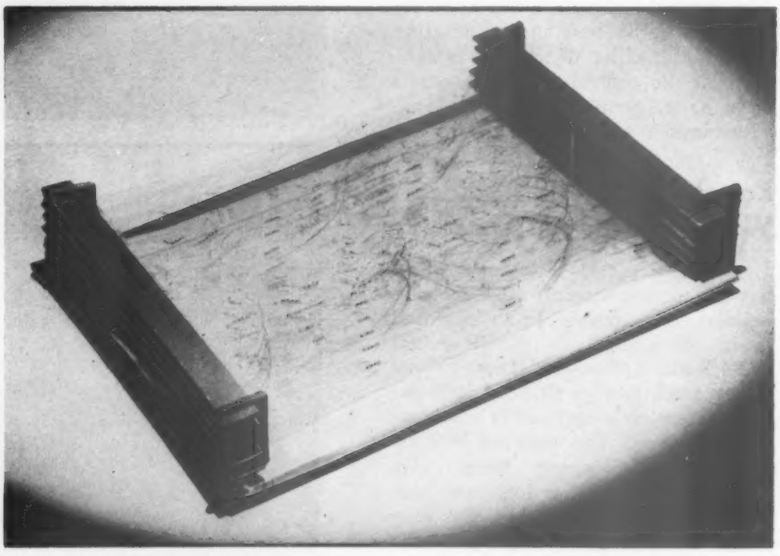
Tool sets vary in weight but not in size

ONE OF THE MOST IMPORTANT TYPES OF HAMMER used in the aviation business is the "soft" mallet. Recently Martin Bersten Company, 20 E. Jackson, Chicago, Ill., has contributed a set of special composition mallets with the unique property of varying weight without varying size. Known as the Saf-ty mallet, these tools provide a workmen more uniform mallet equipment. The hardness of the mallet head composition may also be varied, permitting the purchaser to select the weight and hardness most suited to his needs, without sacrificing size.—AVIATION, *January, 1938.*

Fostoria Socket Seal

Rubber Collar Protects Electric Lamp Sockets

OF PARTICULAR INTEREST in applications where electric lights are subjected to the action of weather, a new molded rubber collar has been developed by the Fostoria Pressed Steel Corp., Fostoria, Ohio, to prevent the entrance of foreign articles into the space between lamp base and socket. Known as the Fostoria Socket Seal, this rubber collar fits over the open end of the socket for medium base lamps, so that when



Protectoid aids weather man in charting air currents

NEW...YET TIME TESTED & APPROVED

The champion of 1937 racing and already a veteran of regular service, the Menasco C6S4 engine has been 2 years in development. It brings the stamina, efficiency and smoothness of Menasco power to a new field which several prominent aircraft manufacturers recognize in specifying the C6S4 for 1938 models. It's in-line, inverted, aircooled and supercharged. Develops 250 h.p. at 5000 ft. and 290 h.p. for take-off. Menasco Manufacturing Company, 6914 McKinley Ave., Los Angeles, Calif.

The Birdmen's Perch

Don't ask us why, but it seems that a lot of people are just as big pushovers as we are when it comes to solving puzzles and brain-teasers. We've published a few in past issues, and would like to try a few more in the future. If you have any hot ones scribble them down for us and shoot them in pronto to:

MAJOR AL WILLIAMS, alias "Tattered Wing-Tips," Mgr., Gulf Aviation Dept., Gulf Aviation Products, Gulf Bldg., Pittsburgh, Pa.

HIGH SPOTS OF RESEARCH

"*Dear Al:* I accept the explanation of Mosley Hussey, Jr. as to 'How Flies Land.' His laboratory has got something there, I think.

"Still, I can't understand how fly specks, (diagram of same will be found at the extreme end of this paragraph), get on the ceiling. If Mosely can figure this out he deserves at least the Collier Trophy."—**Bill Young**

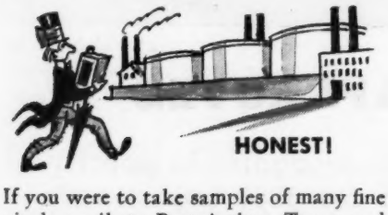
"P.S. I *never* use Gulf Aviation Gas, on account I have no airplane. Good Gulf, however, makes my new Olds do *everything* the salesman said it would, and believe you me that's no applesauce."

NEATEST-FEAT-OF-WEEK DEPT.

"*Dear Butch:* Early last summer, hopping sight-seers from the Trinidad Airport, I took a couple of young farmers for their first hop. At an altitude of about 1500 feet one of them leaned forward and yelled 'We don't seem to be moving at all.' I yelled back 'You guys quit dragging your feet,' and forgot about them.

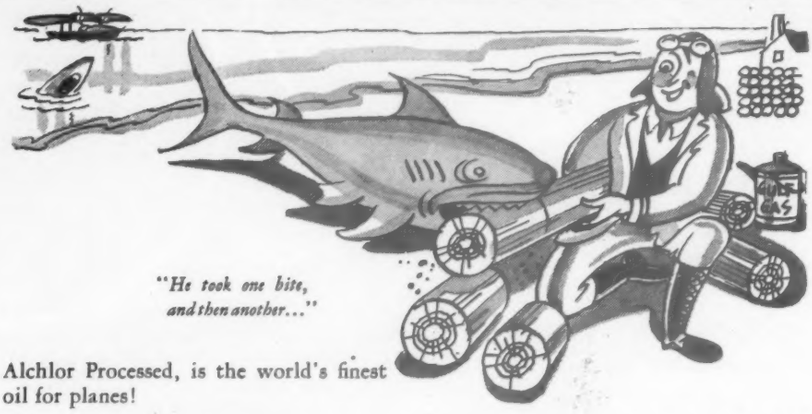
"Some ten minutes later, before cutting the stick to land, I happened to look back and lo and behold the two gentlemen were still holding their feet straight out and about a foot off the floor.

"Says I, 'Okay boys, put 'em down now, we're going to land.' Down came the feet, and we dropped into an easy glide."—**W. R. Sutherland**



If you were to take samples of many fine airplane oils to Port Arthur, Texas, and put them through Gulf's Alchlor Process you'd find this truly remarkable fact:

Out of these oils would come as much as 20% of black gummy waste—waste that, before the perfection of the Alchlor Process, *nobody* could get out of oil. That is why Gulfpride Oil, the *only* oil that is Alchlor Processed, is the world's finest oil for planes!

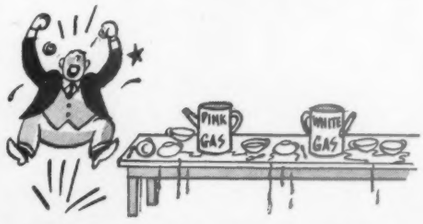


"He took one bite, and then another..."

BUG-HOUSE CORNER

Speaking of puzzles, Tattered Wing-Tips is still having a knock-down fight with some pals of ours over this one:

We told them to take two cups full of gasoline, one pink and one white. We



told them to take a teaspoonful of the pink gas and stir it in with the white gas, and then put a teaspoonful of the mixture back in with the pink gas. We said that they would then have just as much pink gas in with the white as there was white in with the pink. Are we a liar? (*When you write for correct solution, please give permission to quote your letter*).

THIS MONTH'S WHOPPER

"*Dear Major Williams:* Well sir, I lived on a beach and owned a small flying boat. Of course I used Gulf Aviation Gas as this was the only gas I could use that would make the darn thing fly.

"Anyway, one day I happened to spill some of it into the water, and a shark playing around the ship got a mouthful of the gas, and Zzip! away he swam. Only he forgot which way land was, and was several yards up on shore before he stopped.

"I didn't want him to die out of water, so I went ashore and took a fair-sized pole and poked him in the head with it. "He took one bite of that log, and then another and another, and pretty soon I had enough wood sawed up to last me all winter. Now would you believe it, he comes back every fall and wants some of that Gulf Aviation Gas, then he saws wood to last another winter!"—**Harry Cramer**

Dear Mr. Cramer: We believe it! We even had an experience quite similar. Only our fish was a saw-fish instead of a shark.

When he tasted that wonderful Gulf Aviation Gasoline he hopped clear out of the water, fanned his fins just like a humming-bird, and went darting here and there trying to coax another drink.

Of course he didn't do any heavy wood-cutting like your shark, but we could hold up a picture pasted on a board, and he would get all poised and dart back and forth and cut out the dandiest jig-saw puzzles you ever did see.

We haven't seen him since he got married and gave up drinking. But we hear that he's raising one of the slickest little families of flying fishes in the whole Atlantic Ocean—Editor.

Gulf Oil Corporation and Gulf Refining Company . . . makers of

GULF **GULF AVIATION PRODUCTS**

the bulb is inserted the socket-lamp union is fully protected, preventing shorts resulting from action of dirt, chips, grindings, cutting oils, etc.—AVIATION, *January, 1938.*

Window Shopping

THIS MONTH we have selected the following catalogs from among the many that come to our desk, as being of probable interest to readers of AVIATION. They may be obtained by writing direct to the manufacturer:

CONTINENTAL MACHINE SPECIALTIES, INC., Minneapolis, Minn.

The Do-All Digest—A monthly paper devoted to new ideas for use of Do-All equipment.

Contour Machining—A valuable handbook and catalog listing Do-All contour machines and illustrating methods of performing special operations on them.

THE FAFNIR BEARING CO., New Britain, Conn.

The Dragon—A monthly publication dealing with bearing problems.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York, N. Y.

Nickel Alloy Steels for Hand Tools—A sixteen page illustrated catalog listing many applications of nickel alloy steels to uses in connection with tools.

LAMINUM SHIM COMPANY, INC., Long Island City, New York.

Laminum Shims as Used in Modern Aircraft—An interesting presentation of the many uses of Laminum shims on present day airplanes.

NORMA-HOFFMAN BEARINGS CORP., Stamford, Connecticut.

Norma-Hoffman Cartridge and "9000" series feltless precision ball bearings—A ten page up-to-the-minute illustrated catalog. (May be obtained on the Pacific Coast by writing Precision Bearings, Inc., 1706 S. Grand Ave., Los Angeles, Calif.)

THIOKOL CORP., Yardville, N. J.

Thiokol Facts—A monthly magazine devoted to the fascinating story of the development of Thiokol and its uses. Thiokol is the new synthetic rubber.

THE TIMKEN ROLLER BEARING CO., Canton, Ohio.

Timken Seamless Mechanical Tubing—A forty page catalog of Timken steel tubing.

THE PYLE-NATIONAL COMPANY, Chicago, Ill.

Floodlighting Projectors—A loose-leaf catalogue and price list of floodlights for Aviation use and equipment for their installation and replacement.—AVIATION, *January, 1938.*

Aircraft Radio

(*Continued from page 45*)

meters) and 300 Mc. (1 meter). These channels are divided among 18 different services, of which aircraft radio is only one. In addition to the 21 channels assigned to aircraft uses, a large number of channels reserved for government use will be put in service by the Bureau of Air Commerce, in its present program of ultra-high frequency radio-beacons, airport traffic controls, blind landing devices, etc.

Four frequencies (33.42, 35.58, 37.86, and 39.06 Mc.) have been assigned primarily for use in instructing student pilots during their first solo flights. A band of six frequencies between 129 and 132 Mc. has been reserved for airport traffic control, each frequency separated from the next by a guard-band of approximately 500 Kc., making possible a separate frequency for as many as six airports in the same vicinity. Six other airport traffic control assignments, for use by the government, are located in the adjacent band between 126 and 129 Mc. Still higher in the spectrum, between 132 and 144 Mc., are eleven frequencies (132.12, 133.94, 135.20, 136.32, 137.02, 138.28, 138.98, 139.82, 140.52, 141.22, 141.78 Mc.) for radiotelephone service with aircraft in flight, although other aviation uses may be made of these frequencies, so long as they are in accord with the FCC regulations.

All of these frequencies are characterized by a range limited, under ordinary circumstances, by the line of sight between transmitter and receiver. It is thus possible to duplicate assignments many times throughout the country without causing interference.

To acquaint licensees of aircraft stations with the uses of the new assignments, a meeting was called of all licensees and others interested on December 16th at the offices of the Commission. The topics discussed were the changes in rules and regulations necessary to provide occupancy of the new frequencies. Evidence presented at the meeting will be used in forming the rules which will govern operation on the new frequencies.

"Aviation Radio Information", by RCA

THE WORK OF MORE THAN A YEAR on the part of Dave Little's group at Camden has made its appearance in the booklet "Aircraft Radio Information," published by RCA and supplied with each unit of RCA aircraft radio equipment. Single copies are available at twenty-five cents each, and they are well worth it. In this reviewer's opinion, this little book should hang on a tack from the cabin wall of every radio-equipped ship in every part of the country.

The limitations of radio equipment, particularly visual-indicator radio direction finders, have not always been made too clear. It is refreshing therefore to note that "Aircraft Radio Information" opens with six pages of straight-forward warnings on the limitations of radio compass equipment. Little items like night effect, the effect of banking angle on cone-of-silence indications, the necessity of operating the aural indicator at low volume, and the deceptiveness of any type of automatic volume control are all stated with frankness, as is the fact that radio compass indications are not to be depended upon at distances greater than 50 miles.

With these cautions in mind, the rest of the book goes on to list data on broadcast and government stations. All the broadcast stations in the U.S.A., Alaska, Hawaii, and Puerto Rico are listed according to location, with complete information on their antennas, including type of lighting, height above ground and above sea-level, and bearing and distance with respect to the nearest airport. It is easy to imagine the labor which lies behind this listing, and its utility should be in direction proportion to the effort used in compiling it. An interesting aspect of the listing is that by far the majority of the broadcast stations are within five miles of an airport. The list is 69 pages long. Following it is a list of broadcast stations according to frequency and one according to their identifying call letters.

The government lists include the standard listing of radio range beacon stations by states, giving frequency, identifying signals, and weather broadcast schedules. Similar lists by identifying signal and by frequencies are included, as is a list of the airport traffic control stations operating on 278 kc.

The book closes with a listing (reprinted from *Electronics*) of broadcast stations suitable for aeronautical direction finding, a restricted list of 48 stations which enjoy high signal strength in relation to interference, listed according to states, and containing information of the antenna locations.

MODE of 1938

The FOUR-ENGINED TRANSPORT by Boeing!

The year 1938 will mark a turning point in the history of transportation, for it will bring to the airways of America the first four-engined transports, now being built by Boeing for TWA (The Lindbergh Line) and Pan American Airways.

With the introduction of these giant air liners—excelling in comfort, luxury, speed and reliability—four-engine travel will become the preferred standard in air transportation.

Another major aeronautical achievement is being recorded by Boeing in the annals of aviation.

BOEING

BOEING HAS ALWAYS BUILT TOMORROW'S AIRPLANES TODAY

THE AVIATION NEWS

REVIEW, COMMENT, FORECAST

JANUARY 1938

DANIEL SAYRE
C. F. McReynolds, *Pacific Coast*
Blaine Stubblefield, *Washington*
E. R. Lockin, *New York*

Lindbergh Writes a Letter

Rocks Pan-Am Opposition by Asking Bids on 100-Passenger 5,000-Mile Ships

December 9, 1937

Dear Sirs:

Further developments in the field of long range ocean service by the PAN AMERICAN AIRWAYS SYSTEM indicate a need for aircraft representing increases in size, payload and cruising speeds over those now in use or available.

It is contemplated that such an aircraft should have a payload capacity of 25,000 pounds and in this condition be capable of flying 5,000 statute miles in still air when operated at cruising speeds of not less than 200 miles per hour at sea level.

Further it should have stateroom accommodations for at least 100 passengers with dressing rooms, dining room and a galley having adequate facilities for the preparation and storage of food. Crew accommodations should allow for a crew of 16, and cargo compartments should be provided for mail, baggage and express permitting full use of all payload capacity not utilized by passengers.

You are invited to submit one or more proposals for the construction and equipment of three, six or twelve aircraft to be designed and made by you in conformity with the foregoing general description and the details indicated below. Each proposal must, of course, relate to a different design.

Each proposal should be addressed to

C. A. Lindbergh,
Chairman of the Technical Committee
Pan American Airways System
135 East 42nd Street, New York, N. Y.

Thus Pan American Airways last month dropped an assignment onto the design boards of eight of America's biggest airplane manufacturers which coming from any other source would have been referred to the Buck Rogers department. Early reports were that at least five of the addressees (the total list is Martin, Consolidated, Sikorsky, Boeing, Douglas, Curtiss-Wright, Lockheed and North American) have already pitched into the task of preparing proposals. Many an old-timer reminisced that way back in 1931 a similar invitation for bids, which resulted in present clippers, sounded just as futuristic.

The eight pages of accompanying details—over which Pan American technicians headed by André Priester had been laboring since last April—are no less interesting than those startling over-all specifications.

ANDRE A. PRIESTER
Pan American's chief engineer washes his hands of "little" aircraft.

Proposals are called for in two parts. All those receiving the bid invitations may make First Part submissions which are to include preliminary three-view and explanatory drawings of parts of major importance: preliminary weight and performance estimates; power plant specifications; and tentative price schedules for three, six or twelve aircraft and equal additional lots on option. These First Parts are requested by March 15, 1938. Then after preliminary contract discussions Second Part proposals may be called for, Pan American paying $35,000 for each one submitted.

Second Parts will be, of course, full engineering designs and analyses including wind tunnel and other practical studies. These are due six months after request.

A few sample excerpts:

"Special consideration will be given to designs which incorporate features permitting operation of the airplanes at 20,000 feet altitude or higher with interior cabin pressures equivalent to 8,000 feet altitude.

"Based on advanced engineering theory and practical experience, the structure of the aircraft covered by

(*Turn to page* 66)

THE FLIGHT PLAN

Army radio experts at Wright Field are working on an automatic take-off modification of their robot-landing device demonstrated last Fall. Tests, if Washington approval is granted, will be at Muroc Dry Lake, Calif.

Wyoming Air Service, after trouble getting satisfactory airports lined-up, will open that Cheyenne-Huron mail run they won last Summer about March 15.

The annual SAE meeting in Detroit, Jan. 10-14 will hit over 2500 in attendance. Aeronautical sessions (four out of eighteen total) will stress aerodynamics, engines, blind landings.

A bill will be introduced in the next session of the Oklahoma legislature to create a three-man state aviation commission. Two must have transport licenses; all serve without pay. There will be a big Southwest Aviation Conference in Oklahoma City, March 11 and 12, and another in Amarillo, Texas, early in September. Both governors are backing them both.

Expect: (1) More details soon on a round-the-world-flight this coming Spring by Howard Hughes in his new S43. (2) Squawks any time from the Japanese about the Navy's air experiments in Alaska. There's a patrol squadron already operating from a small base off Sitka. Kodiac and the Aleutians are under consideration for a big-time base.

Put In Your Date Book: (1) The annual technical meeting of the Inst. of the Ae. Sc. (at Columbia University, Jan. 24-26). (2) The International Air Show (Chicago, Jan. 28-Feb. 6). (3) California's Annual Aircraft and Boat Show (Los Angeles, April 2-10). (4) The National Air Races (Cleveland, Sept. 3-5).

ALL THE HARDWARE: Headliners of the Miami All-American Air Maneuvers pose with their trophies. Left to right—Bob Davis of Bloomington, Ill., who won a stock model race; Steve Wittman of Oskosh who won all unlimited speed races; Jacqueline Cochrane who pushed her Seversky to a new New York-Miami record of 4 hr., 12.5 m.; Karl Voelter of Miami, winner of a race for C-licensed planes with engines under 200 cu. in.; Lem Povey, Cuban Army instructor, one of the leading stunters. Total attendance for the three-day meet was 29,000, best yet. More than 500 planes were on hand, most of them Cubs, Taylor-Youngs and Aeroncas. Major Seversky helped open the meet with a New York-Miami dash in 5 hr., 02 min. Lawrence Schmidlapp of Cincinnati won the cruise to Havana that closed it. The Marines put on a good show daily. Only tragedy occurred on opening day when Rudy Kling and Frank Haines were killed at the scattering pylon of he first unlimited speed race.

Nation Needs An Air Policy, Wilson

N.A.S.A.O. holds Miami convention; demands stability for industry

THREE DAYS OF MEETINGS with dozens of speakers discussing the problems of almost every division of the industry constituted the annual convention of the National Association of State Aviation Officials. The conferences attended by representatives of 40 States preceded the All American Air Maneuvers at Miami.

New officers elected: Floyd Evans (Michigan) president and C. L. Morris (Connecticut) first vice-president. The several sessions considered the present status of aviation insurance, private flying, promotion of aviation by states, airport development, air transport, regulation, soaring, and related subjects. And in an eloquent valedictory, President Wilson summed up the platform and the fundamental objectives of the N.A.S.A.O. A few excerpts from his report follow:

"Size has its place in progress but in addition to hearing much about bigger, heavier, faster aircraft, I, for one, would like to hear something about lighter, cheaper, simpler, more adaptable aircraft. . . . The public welfare is vulnerable through lack of a National Aviation Policy. The report of the President's Commission (F.A.C.) gathers dust in the files. Budgets are inadequate to guarantee public safety. Unhealthy conditions force our air transport systems to such fierce competition that the savor is gone from the game . . . Federal agencies are a house divided against itself in the struggle for prestige of control of aviation. Aircraft develop without the least relationship to airports. Aids to navigation are totally inadequate. . . . None of the confusion existing will be remedied until a national policy is enunciated. . . . We think a National Aviation Commission should be created immediately.

"I would recommend the creation of a Bureau of Federal Airports. Had it not been for the W.P.A. airport work, air traffic would have been brought to a practical stop by the advent of the big ships. Federal participation in the construction, improvement, and maintenance of airports is imperative.

"Air transport subsidy should be direct. . . . The Post Office Department should have its own contracts with the airlines but should not be the subsidizing agency. . . ."

Air transport problems were dis-

(*Turn to page* 66)

SPOT LANDINGS

On the Month's News

• **Bright spots on a drab airline traffic record** are figures released by Eastern Air Lines covering the first ten days of December. Number of passengers carried ran 69 per cent ahead of the corresponding figure for 1936. Passenger miles were 73 per cent ahead. Plane miles 59 per cent. This recession must be an east-west-only proposition.

• **Self-supporting at two,** is a good record for man or project. Pan American's trans-Pacific air mail service hadn't quite reached it by Nov. 22 when it passed its second anniversary —but postage revenue was returning over 90 per cent of its outlay to the Post Office on the Alameda Honolulu leg and more than half the outlay (of $2 per mile) on the remainder of the route. A trans-Atlantic mail service at similar or lower mileage rates ought to start lifting the mortgage on some of Mr. Farley's marble halls.

• **The Air Corps awarded . . .** (1) The Luke Trophy, for excellence in machine gunnery, to the Seventy-seventh Pursuit Squadron, Barksdale Field. (2) The Colombian Trophy, for safety of operations within the GHQ, to the Third Attack Group. (3) A contract to the Wright Company for fifty-six 1,000 hp. Cyclones and eighty-two 850 hp. Cyclones. Total $2,044,491. (4) A contract to Pratt and Whitney for 43 double row fourteen cylinder engines at $447,329. (5) A contract for thirteen Curtiss P-37 pursuits at $531,305. They are to be fitted with liquid-cooled engines instead of radials as 210 now on order.

• **The Navy awarded . . .** (1) The Noel Davis Trophy, for the most efficient division of the naval air reserve, to the First Aviation Division Squadron VS—12R stationed at Fairfax Field near Kansas City, Mo. All its pilots work for TWA. (2) The Schiff Trophy, for greatest safety, to the VP Squadron 7 at San Diego. (3) A contract to the Consolidated Aircraft Corp. for 33 patrol planes, type VPB at a price of $4,500,000. These are the first ships to be ordered from the bid opening of Oct. 29.

• **The Navy dispatched** fourteen big Consolidatel patrol boats on another routine transfer of equipment from San Diego to Coco Solo. C. Z., Dec. 8. Twenty-one and a half hours later they had all arrived in first class shape. The force of ninety-eight officers and men

who made the trip were under the command of Lieut. Comm. B. E. Grow.

• An airship vs. flying boat skirmish flared up just after the Maritime Commission released its report last month. What started it was the distribution to interested parties of an Aeronautical Chamber brief which it had submitted to the Maritime Commission (on invitation). It was an out and out pro-flying boat anti-airship treatise. Rosendahl told the press it was unfair and repeated some of the well known pro-airship arguments. The Chamber said it was doing no more attacking than airship proponents had been doing for years, and that airship interests had likewise submitted a brief to help the Commission make up its mind.

• Exports are still stratosphering. For the first ten months of 1937 they totalled $31,088,911 compared with $18,271,077 for the corresponding period last year. October sales included: 61 planes, $1,845,597; 85 engines, $531,367; parts and accessories $1,325,268. Argentina and Brazil were best customers.

• Making 22 parachute jumps in one day may not make much sense but it makes, we are told, some sort of a record. Mrs. Fay Lucille Cox hung it up recently before a crowd of 10,000 at Wiley Post Airport, Oklahoma City, Okla. Russian papers please copy.

• Aviation Day was celebrated Dec. 17. Besides the new Wright Lecture by the Inst. of the Ae. Sc., the Air corps put planes in the air at 10:30 A.M. wherever possible—to celebrate Orville's first flight of course. But did you know a group called the Pennsylvania Aircraft Syndicate will get together for luncheon at the Penn Mutual Life Ins. Co. in Philly on Jan. 8 to celebrate the real first flight in America—a balloon ascension from that city in Jan. 9, 1793 by the Frenchman Jean Blanchard.

• Barkley-Grow came to town last month with their new low-wing twin-engine all-metal T8P1 transport. A personable young gal named Mrs. Jane Topping pushed one across from Detroit to Roosevelt Field in just 2 hr. and 20 min. Probably an all-time low for the course. With her were H. B. Grow, Frank Cordova and E. F. Skoc-dopole who served as co-pilot.

• $5,000 insurance for 25 cents for each four hours of flying are new rates announced for scheduled air transport by a group of four underwriters—Fidelity and Casualty Co.; Firemen's Fund Indemnity Co.; Glenns Falls Indemnity Co. and the United States Guarantee Co. Former rates were some four times as much. Now railroad insurance rates per mile of travel are no lower.

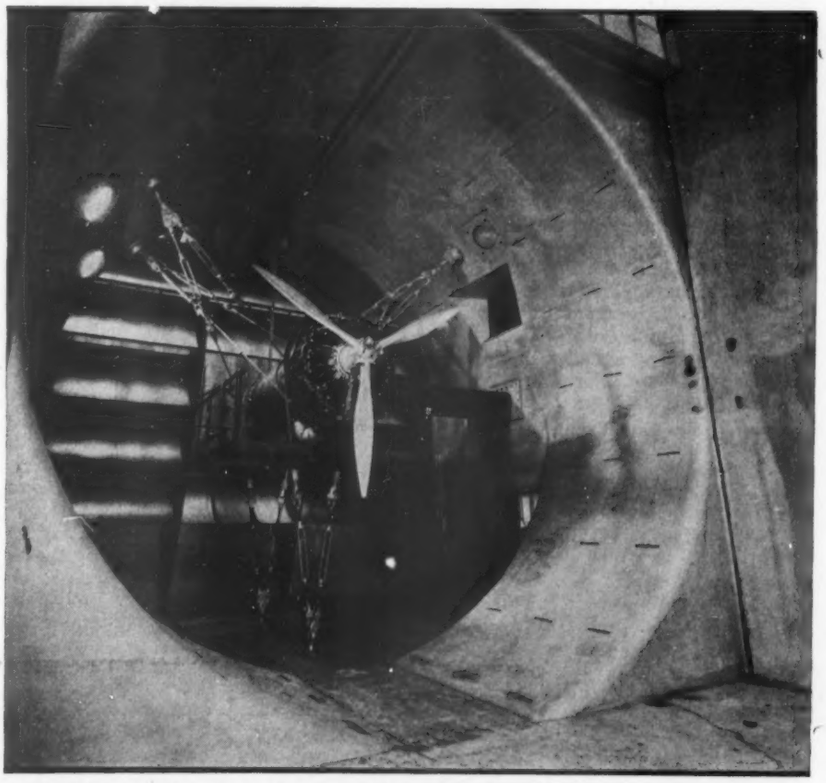
Orchids to Major Gardner

Institute Marks Wright Flight with Lecture and Honors Night.

BRILLIANT WIND-UP for a year already bright with aeronautical achievement was the series of meetings held in New York on December 17, thirty-fourth anniversary of the Wright Brothers' flight. The occasion was honored by the presence of Orville Wright and Charles Lindbergh, and by the participation of Professor B. Melvill Jones, Cambridge University, England.

Presentation of the first Wright Brothers' Lecture was made fittingly in Pupin Physics Laboratory at Columbia University. Professor Jones' subject was "Boundary Layer Experiments in Flight," a resumé of work done in British laboratories. Discussion of the paper was ably handled by B. C. Boulton of Glenn L. Martin Company, Dr. Hugh Dryden of the U. S. Bureau of Standards, Dr. W. F. Durand of Stanford, Dr. J. C. Hunsaker of M.I.T., Dr. G. W. Lewis and Eastman N. Jacobs of the N.A.C.A., Igor Sikorsky of Sikorsky Aircraft, and T. P. Wright of Curtiss-Wright.

Following the Council Dinner at the Biltmore, came the Honors Night ceremonies. Under the chairmanship of the Honorable Harry F. Guggenheim, Honorary Fellowships in the Institute were presented to Professor B. Melvill Jones and to Glenn L. Martin. T. P. Wright outlined the history and purpose of the Guggenheim Medal, which was then presented to Dr. Hugo Eckener (in absentia) by Dr. Harvey N. Davis, president of the A.S.M.E. Commander C. E. Rosendahl accepted the medal on behalf of Dr. Eckener. The Sylvanus Albert Reed Award went this year to Eastman N. Jacobs,—was presented by the Honorable Edward P. Warner. The Lawrence Sperry Award for achievement by young men in aviation went to Clarence L. Johnson of Lockheed, Elmer A. Sperry, Jr., making the presentation. Ten new Institute Fellowships were presented, and Honorary Memberships went to Dr. Lyman J. Briggs, Rear Admiral A. B. Cook, Fred D. Fagg, Jr., Dr. W. R. Gregg, Hon. Harry F. Guggenheim, Dr. George W. Lewis, Maj. Gen. Oscar Westover, and H. E. Wimperis, President Royal Aeronautical Society.



HORNET'S NEST DE LUXE: One of four test chambers in Pratt and Whitney's new test house built to supplement 32 smaller test houses already in busy operation. Externally the house is a gem of modernistic functional architecture. Eighteen-inch walls of reinforced concrete and layers of a new sound-proofing material in intake and exhaust stacks cut noise-to-the-outside to new minimums. Engine set-ups can handle up to 3,000 hp. and swing 23 ft. propellers

Loening Findings To Be Law?

Congress gets ocean-line bills. Witnesses hit at Pan-Am "monopoly"

WITHIN A FORTNIGHT AFTER chairman Joseph P. Kennedy of the Maritime Commission transmitted to Congress the report "Aircraft and The Merchant Marine" (abstracted last month in the Aviation News), bills that would put its suggestions into law were introduced into both houses of Congress.

The House bill, HR 8532 introduced by Congressman Bland and the Senate bill S 3078 sired by Senator Royal Copeland, each deal largely with amendments to the present Maritime act as it relates to shipping. Each contains one paragraph however which is practically identical in wording and packs all the wallop of a revolutionary manifesto as far as the air transport industry is concerned—

"Sec. 215. The provisions of this Act, insofar as they are practically or appropriately applicable, are extended to the construction and operation of aircraft used in transportation for hire of passengers and property in overseas trade between the United States, its Territories, possessions, or the Canal Zone and foreign countries . . . Just what "insofar" meant to the Maritime Commission emerged Dec. 2 as Kennedy appeared before the House committee on Merchant Marine and Fisheries, outlined most of the arguments set forth in the above mentioned report and indicated that subsidies up to 50 per cent of construction costs and later operating subsidies might be very helpful to America's trans-oceanic air projects and would be possible if such projects are brought under the Merchant Marine Act, at present such expenditures would not be required because little or no differential existed between American and foreign costs. But the Commission might well advance funds on, loan to finance the construction of big ocean going flying boats or itself build the craft and charter them to operators.

Meanwhile the House group were hearing other testimony. I. M. Laddon vice-president of Consolidated Aircraft charged that Pan American Airways was monopolizing transoceanic aviation. He said the government should acquire necessary foreign concessions to permit free and open competition. John E. Slater, vice-president of the American Export Lines said his company was convinced it would be economically sound to use flying boats to supplement its shipping. Endorsing transfer of control to the Maritime Commission he too attacked the Pan American "monopoly." His firm, attempting to negotiate landing privileges with the Portugese government had been told Portugal had signed an iron clad agreement with Pan American which excluded all other Americans.

Dec. 15, American Export's president, W. H. Coverdale issued copies of a letter he had addressed to all members of Congress.

"Our observations clearly indicate that American Export Lines with its steamships, radio, terminals, personnel (both foreign and domestic), diplomatic contacts, etc., is in an excellent position to undertake the operation of large flying boats. . .

"We are now ready to start on a development and replacement program which will involve the expenditure of more than twenty-five million dollars—four-fifths of which is to be for steamships specially designed, and the balance for large flying boats, obstacles stand in the way of our spending program. . .

1. It would be impossible for a second American company, interested in the operation of aircraft across the Atlantic, to get started if Section 305 (k) of the McCarran-Lea Bill is allowed to become a law.

"If any person applying for a certificate for foreign air transportation, holds a contract, license, permit, concession, or franchise, which was in effect at the date of the passage of this part, permitting such transportation, the Commission shall give preference in the issuance of a certificate to such holder over any other applicant, if such holder is fit, willing, and able properly to perform such transportation."

SENATOR PAT McCARRAN
Most lines want his bills to pass

2. It would likewise be impossible, from a practical angle, for a second company to get started under the existing method of awarding foreign air mail contracts. . .

"If these general observations are correct, and we believe they are, then "overseas" flying should be under the Maritime Commission, or at least under some commission or department, that would be closely liaisoned."

At Last—A Port Solution?

Bureau meeting finds minor law change all that's needed—maybe

A DECISIVE MOVE toward solution of the nation's airport "shortage" was made December 6 and 7 by the Bureau of Air Commerce in joint session with air transport and several allied interests.

Discussions developed that—barring some unexpected development in airplane design—steady increases of landing speeds and wing loadings will continue and airport expansion must also go on to some now-unpredictable maximum. Catapulting and perfection of the under-carriage for one-way landing were the only partially-promising relief measures in sight. Obviously the government must help develop and share the control of such inter-state assets as airports.

Results of the meeting simmered down to a sentence: a legislative committee of three was appointed, which probably will ask Congress to place regulatory and subsidy power over public airports in the hands of the Commerce Department.

The legislative job is expected to be done in a direct and simple manner that would disgust most law-makers. It is proposed merely to strike out the words "except airports and terminal landing fields," from that section of the Air Commerce Act of 1926 which places the airways under authority of the Secretary of Commerce.

Delegates, making all the plays over again in marble halls and cocktail lounges, credited this adroit move to Shorty Schroeder, operations vice president of United Air Lines, and former assistant director of the Bureau of Air Commerce. While other thinkers wrinkled their brows over the prospect of writing a long bill for Congress to throw around, the tall, hungry-looking Schroeder suggested drawing a line through two words. Of course that doesn't get away from it all. The people who put "except airports" in the act, or their spirits will protest.

The meeting was presided over by Colonel J. M. Johnson, assistant secretary of commerce, with Fred Fagg, Bureau director, and Major A. B. McMullen, airport section head, on his left and right.

Federal subsidy for public airports is expected to be set up somewhat after the pattern of federal aid for highways, with local government matching funds in some substantial proportion. Ever

since high wing loading in air transport began, talk of inadequacy of some airports has increased. Arguments why the government should help pay the bill are too well known to need repetition. At last, when sizeable towns were passed up by operators, and pocketbooks were touched, the cities cried aloud and the Post Office and the Department of Commerce had to act. It was not a pleasant task, because the cities had been told by good authorities, including the Bureau of Air Commerce, what kind of airports to build. Now that those ports prove inadequate, city officials say they can sell no more bonds to liquidate aviation's mistakes unless they have assurance it will end somewhere short of fields the size of the Great Salt Desert.

Additional authority for the Bureau, at this time when other government agencies are trying to strip away some of its functions, would be regarded in some quarters as a considerable Commerce victory. Administration of the physical airways, plus airports, may some day be many times the job it is now. The responsibility will be great.

And it will be political, say irrepressible hecklers. For every town and city will want money spent on its field. City officials will claim they can deliver a certain quantity of traffic if their ports were suitable for operations. And the Bureau would have to fight a three-ring battle with municipalities and the Post Office, the Interstate Commerce Commission, or whatever authority controls future expansion.

Principal speakers at the meeting were Clifford Ham, Major R. W. Schroeder, Leighton Rogers, Col. Floyd Evans, Dr. George W. Lewis, Admiral A. B. Cook, Hon. Harllee Branch, A. E. Ellenstein, Hon. Louis Johnson, Col. F. C. Harrington.

COL. J. MONROE JOHNSON
Would give up airline safety control for say over airports?

AVIATION IN WASHINGTON

by BLAINE STUBBLEFIELD

ICC and Maritime kill off the field in last-lap dash

» STRONG FAVORITES this month to win the government agencies' derby for authority over air transport are the Interstate Commerce Commission and the Maritime Commission. The Post Office is a lap behind, seemingly out-classed, and the Department of Commerce, until recently clipping the tails of the two big commissions, is missing fire and losing revs. Only the last minute rush of a dark horse independent commission entry could slow the leaders now.

Nothing short of a miracle could produce any air transport legislation before the regular session. But the McCarran group, seeking ICC certificate control to replace Post Office contracts, and the safety regulation now exercised by the Bureau of Air Commerce, is entrenched for battle at a moment's notice. An opening might possibly come in the Senate, which is not concerned about wages and hours, having passed the bill last session. And the maritime sponsors, who want to regulate and coordinate oversea flying with surface shipping under the ship subsidy law, have bills in both sides of Congress and their testimony is in the record.

» REASONS WHY the Commerce Department gave ground to the ICC group are not clear-cut but they are deep-rooted. The compromise began in the President's aviation legislation committee, whose announced purpose was to untangle the government authorities and conflicting pending bills. Most observers believe Secretary Roper and his assistant, Col. J. Monroe Johnson, asked the President for the committee, and that they hoped the committee's recommendations would defeat McCarran's bill. But some of the six assistant cabinet men disagreed and from then on it was a losing campaign.

Of the 19 who died in the Utah crash, one was a prominent Washington woman, a friend of the Presidential family and of the Cabinet families. Senator Cutting's death had already impressed congress. Now this new disaster walked into the White House. And eventually to Commerce went a question—more accusing than it might have been in the days of friends Earhart and Vidal: Why do airplanes run into mountains? The answer was not satisfactory to the bereaved.

And a third reason for a compromise by Commerce is a failing stomach for blame that is heaped on its head for many airplane accidents. Commerce knows, as all air technicians know, that crashes cannot be stopped simply by transferring authority from one of Washington's temples of wisdom to another. True, a well-founded transfer might help. But ships at sea have been crashing for millenniums, still do. Commerce might be much happier letting the ICC try to explain why radio ranges split and swing and fade.

All in all, if Commerce gets a law whereby it will subsidize and regulate public airports, in addition to its administration of the physical airways and the control and promotion of private flying, it might feel satisfied to part with the troublesome safety administration. Commerce lawyers say that the Department of Commerce was created as a business promotional agency, and that regulatory power is incompatible with promotion when the two are applied to the same enterprise.

» The Post Office resistance to growing power of the ICC and Maritime groups is weakened by increasing internal non-support of the Crowley-McKellar challenge. Very few Post Office executives give a tinker's dam whether ICC or PO designates the routes and writes the mail checks. A few of them (privately), even oppose the Crowley-McKellar cause, and the rest are disinterested and won't help. The Post Office as such is not the defender. The fight is against the Air Mail Law and the only two men who have the will to uphold it.

» But while opposition to ICC control is weakening on land, it is growing stronger at sea. Joseph Kennedy, chairman of the Maritime Commission, is leaving behind him strong forces for his objective. Admiral Emory Scott Land, favorite candidate to succeed him, is an airman, was assistant chief of the Bureau of Aeronautics, vice president of the Guggenheim Fund. He is not the type that would be influenced by his cousinship with Colonel Lindbergh, adviser of Pan American Airways, which opposes the Commission's plans.

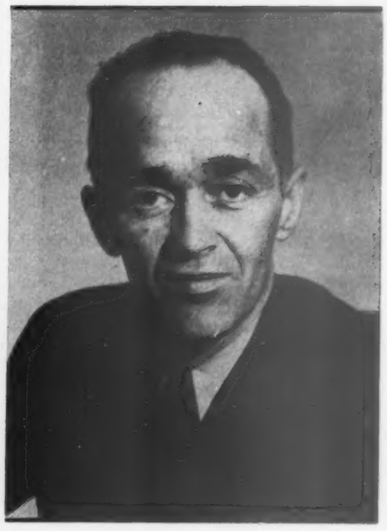
In fact the entire Martime Commission will stand firm on the Kennedy program. It is said on good authority that the Commission occasionally split on issues before it, but its decision on the question of oversea air control was unanimous.

AVIATION PEOPLE

Who's Who in This Month's News

Rudy Kling's meteoric career in aviation is ended. It began in a workshop back of his garage in Lemont, Ill., where he helped design and build the stubby little racer that was to carry him to fame. It reached its zenith at the Cleveland Air Races last September when his spectacular flying won him the Thompson and Greve Trophies and the Henderson Merit Award. It came to its tragic conclusion on the first day of the Miami Air Races on Dec. 3 when his home-made plane crashed as he turned the scattering pylon, well ahead of the other contestants. Kling was the fourth of eight Thompson Trophy winners to meet death in a plane crash. A few seconds after Kling sideslipped into the ground, Frank Haines, a private and commercial pilot from Detroit, spun in on the same U-turn.

Success is no novelty to **Jacqueline Cochran.** Last month she added substantially to her laurels. Taking off from Floyd Bennett Field on Dec. 3 in her Seversky racer, she landed at Miami during the All-American Air Maneuvers 4 hours and 12 minutes later, covering the 1,176 miles at an average speed of nearly 280 m.p.h. This topped the record held by Helen Boucher of France for the Women's International 100-kilometer speed of 256 m.p.h. Miss Cochran had already established a 3-kilometer record of 293.5 m.p.h. at Detroit in September, and placed second in the Bendix Race for 1937. Success first came to her at the tender age of 14 when she was earning her own living. Before she was 20 she had opened a beauty shop in Miami, later added shops in New York, Chicago, and Los Angeles. Most significant achievement was the winning of a $200 bet in 1932, that she could earn her flying license during a three weeks' vacation. Continuing her flying, she took off on the first leg of the London-Melbourne Race in 1934 as the only woman entrant. Although grounded by mechanical trouble in that race, she persevered in her progress toward the high-speed queenship.



Jack Knight will have to get used to resting his heels on a desk. After logging 2,400,000 miles—probably more than any pilot in the world—he has retired from active flying to become director of United's public educational program, with headquarters in Chicago. Jack learned to fly at Ellington Field in 1917, becoming instructor of acrobatics in the Army service. Time out for an engineering job after the Armistice lasted only until the sound of motors over Chicago lured him into the U. S. mail service in 1919. In 1921 Congress was considering abandoning air mail appropriations and Knight was one of seven pilots who volunteered to prove that an airway lighting system would make air mail practicable. His night flight from Chicago to the West Coast, guided only by bonfires, proved the point, saved the day for air mail, and brought him international prominence. The New York-San Francisco airway became the first lighted and improved air route in the world. When United took over the route in 1927, Knight flew the Chicago-Omaha division, later the Chicago-Denver section. He has logged over 18,000 hours.

Bruno Mussolini, youngest of the Flying Mussolinis, broke a record last month. Accompanied by his flight instructor, Col. Attilio Biseo, he flew a Savoia-Marchetti, loaded with 1,102 pounds of weight bags, 621.37 miles at an average speed of 267.58 m.p.h., thereby bettering three international speed records. Bruno's smiles, however, were short-lived, for half-an-hour later came a radio announcement from Berlin that a Heinkel pilot, carrying 1,000 kilograms in a twin-motored bomber, had averaged 313.24 m.p.h. Young Mussolini placed fourth in the race to Damascus and has seen active service with Spain's rebel air force. He has lately been based at Majorca. Brother Vittorio, a recent visitor to this country, served seven months with a bombing squadron in Ethiopia. Hot off the press is his book "Flying Over Ethiopian Mountain Ranges" wherein he describes the "magnificent sport" of bombing. "I remember that one group of horsemen gave me the impression of a budding rose as the bombs fell in their midst. It was exceptionally good fun."

Bill Arthur rates as one of the old men of airport construction in spite of his mere 45 years. Over fifteen years ago he was working with the Post Office in building its airports at Hadley Field, Bellefonte and Cleveland. Since then Newark, Omaha, Burburbank, Washington, Los Angeles, are a few of the score of cities he has helped on their airport problems. Last month he joined Hegeman-Harris, New York building constructors, as manager of their new airport department.

Propellerman Frank Caldwell has been elected vice-president of the S.A.E. Interested in his specialty since his M.I.T. days, he has served successively as chief of the propeller department of the Curtiss Aeroplane & Motor Co., chief of the propeller engineering division of the Army Air Service, chief engineer of Standard Steel Propeller Co., and engineering manager of Hamilton Standard Propellers. His contributions to the science brought him the 1935 Reed Award, the 1933 Collier Trophy.

Rensselaer Clark was once a Lieutenant Commander in the Navy. Now he has been made vice-president in charge of the airplane divisions of United Aircraft Corporation. After graduating from the Naval Academy, Clark served with the Navy from 1904 until 1919, receiving the Naval Cross for Distinguished Service in Ordnance during the war. After sixteen years with E. W. Bliss Company, he joined the Sikorsky Aircraft Division of United in 1935, as assistant general manager.

A smart young man named **E. Dillon Smith** has been made assistant to President Jack Frye of TWA. His rise to the post is an illustration of the training essential to today's airline personnel who work toward executive jobs. Smith took a Bachelor's and Master's degree in engineering at Iowa State College, then his Doctorate at Columbia. He has held transport pilot's, aircraft and engine mechanic's, and radio operator's licenses. At present Smith is also a professor in mechanical engineering at the College of the City of New York.

Eastman Jacobs, another of aviation's youngsters, has walked off with the Sylvanus Albert Reed Award. At 35, this is his second scientific recognition (he won the Wright Brothers Medal in 1933). Last month the Institute of the Aeronautical Sciences named Jacobs "for his contribution to the aerodynamic improvement of airfoils used in modern military and commercial aircraft." The wide use of his wing form designs has boosted safety and performance, thus marking his NACA work as an "outstanding contribution."

Captain E. D. McWhorter, is first commanding officer of the aircraft carrier "Yorktown." The Navy's latest pride has been under his command since its first acceptance trials. Captain McWhorter graduated from the Naval Academy in 1906, saw wide and varied service with the fleet until 1927 when he went to Pensacola for flight training. He has served as Chief of Staff of the Aircraft Scouting Force; a member of the Aircraft Base Force Staff; Chief of Staff, Aircraft Battle Force; and commanded the Coco Solo Base.

LOGGING THE LINES

Air Transport Drift Sights by DAN SAYRE

Rate wars, low-level ads, follow traffic dive. No stability in sight.

A wave of distemper swept over the transcontinental airlines last month, that left this neutral onlooker wondering whether a lot of airline officials had gone nuts or was it some individual daffiness that was making him (the observer) see and hear so queer.

Assuming the queerness to be an airline not a personal matter, the clinical record can be put down something like this.

A group of five airlines, American, Northwest, TWA, United and WAE, fairly at peace with one another, last year passed through an exceedingly tough winter full of accidents. Of them all only American came through the winter with a clear record. Following long established precedent, it made no attempt to capitalize its good fortune, probably realizing from past experience that over a period of three or four years no one airline or route dared risk such a policy. The transcontinental rate structure didn't suffer too badly either. TWA cut its rates in November 1936 by 15 per cent but in the Spring of 1937 parity was once more restored between TWA, United and American—at a point between TWA's bargain tariffs and the previously normal one.

It seems dubious to us that reduced prices had much to do with the record flow of passengers that crowded all airlines last summer and made June through October each better traffic months than any pre-1937 month in airline history. More obvious causes were the new fleets of luxury day and night equipment that came into service; new offerings of convenient schedules; a realization by the public that all airlines and several government bureaus were doing everything they could think of to prevent any more accidents.

Along about Labor Day came a stock market break and first talk of a business recession. In October a United Mainliner lost its course in a severe local squall and crashed into a mountain east of Salt Lake City. All over the country the general recession deepened.

In November TWA announced a harmless looking fifteen-per cent-off excursion rate on round trips started Saturdays and Mondays. And Braniff brought out a similar schedule. Weather during the month wasn't too good. By the time traffic figures started coming in for enough of the month to be indicative, airline executives realized that—for the first time in at least four years—passenger traffic for a month's operations had fallen below the corresponding period for the year. In the language of Aviation's Transport Indicator, the index of airline business had fallen from 120.1 Oct. 1 to 107.1 Nov. 1, to 73.9 on the first of December.

Airline officials by that time had already—and very properly—cut heavily into seat offerings by eliminating a good number of schedules. This vicious-circled somewhat because fewer flights attract fewer passengers, but it could hardly be helped.

Then last month the real trouble started. Northwest, with a new fleet of hot ships and a new-won permission to extend its service to Portland, announced a new schedule of "educational" fares to run during January and February; One way between Chicago and the Twin Cities $14.50; round trip $15.00 (that's less than 2 cents a mile). One way Chicago and Seattle $94.00; round-trip $141.50 (that's about 3.5 cents per mile).

Western Air Express also went educational by cutting round trip fares from eighty to twenty-five per cent above one-way tariffs. Two weeks after Northwest's slash announcement United came out with identical fares—between Chicago and Seattle, Portland, etc. That brought about the cock-eyed state of affairs that it will be cheaper to fly from Chicago to points in Washington and Oregon via Salt Lake City than to fly from Chicago to San Francisco—and it will only cost a few dollars more than flying from Chicago to Salt Lake City. San Francisco and Salt Lake are as certain to howl as New Year's comes after Christmas. If United gives in to them, the whole transcontinental rate structure is kicked into ribbons.

Now remember that all this went on in an industry which had rarely been able in past years to ever get fares cut "for the winter only" all the way back up to the former level. And in an industry which has never yet shown that 5 cents per mile passenger tariff is adequate to insure even modest profits except under very favorable circumstances. And in the face of a universal demand from railroads and bus lines for ICC permission to *raise*, not lower, their fares.

Also last month—just to make everything really dandy—American went off the reservation with its advertising. Big full-page splashes in newspapers and magazines, in the official guide used by booking agencies, in direct mailing pieces came a great query: "Is there a low-level airway through Southern Sunshine to California?" What is beyond reasonable doubt a gal in a skin-tight bathing suit presumably is shouting the answer—American Airlines. Exhibit B is a box entitled "Quick Facts About American's Southern Sunshine Route". Nowhere (except by un-

WHY NOT?
Airline Transport Association ads like this to plug all airline safety equally

INSTEAD OF
One line ads urging an individual route as safer than competing airways.

Quick Facts About American's Southern Sunshine Route

	Altitude Above Sea Level (Feet)	Average Winter Temper. (Daytime)
Nashville	560	52°
Memphis	258	64°
Ft. Worth—Dallas	650	72°
Tucson	2500	74°
Phoenix	1100	74°
Los Angeles	460	72°
Average for entire route (N. Y. to L. A.)	1021 ft.	61.3°

mistakable inference) is the word Safety mentioned. That Mr. & Mrs. Public go for it cannot be denied. Reports are in New York that the ad is drawing heavily. American defenders say the ads are justifiable on account of American's recent safety record and that the traffic produced consists of people who wouldn't have travelled at all this winter unless they had learned about the blessings of low-levelism.

American's competition, and they know their own figures, claim the ads draw people directly off their planes; that the "Quick Facts" box is misleading.

Most obvious crack was: What's going to happen if the public does come to believe in one sunshiny no-mountain airline and that airline loses another plane in a moonlit swamp? That actually American's own strip map shows its route, via Washington and Nashville, crosses more miles of mountain country than either TWA or United and that the same map shows peaks up to 9,000 and 10,000 feet lying along American's Southwest routes.

In any case, in mid-December United put out answering ads—at a bucketful of hard-earned dollars an answer. And there were rumors TWA was also working on such copy.

What can stop all this? Something has already stopped the big splash ad fight. Someone got the airline heads concerned into a smoke filled room and got them to put away their hatchets. But if traffic drops a few more notches is it going to start all over again? An Air Transport Association given some real powers by the airlines might prevent it.

Ever since that association's inception there has been a push on to get a campaign of general air transport advertising launched, which would be similar to that of the Association of American Railroads. But there is always some one big holdout to block the others and evidently the A.T.A. lacks authority, to govern save by gracious permission. ICC control would straighten out rate troubles or would have prevented them from starting. So would full control by any non-discriminating non-political commission. On other pages we discuss pending legislation which may bring one of these into being—but not until next Spring.

With a decent rate structure, a united push for traffic new-to-airlines, and a clear accident record for the rest of this winter, the airlines business could write its own 1938 ticket, recession or no recession.

But if things go on like this, there won't be a black ink statement in the industry a year hence even if the U. S. Steel is selling at 300 and every share cropper is driving around in a limousine.

AVIATION BOOKS

In Tabloid Review

LAST FLIGHT—*Amelia Earhart*—Harcourt, Brace & Company, Inc., N. Y. 229 pp. cloth—Ill.—$2.50. A record of the background, preparation and conduct of the projected round-the-world flight that ended in silence off Howland Island. Simply written, well illustrated with photographs and log facsimilies.

MINE HOST, AMERICA—*Mark Pepys, Earl of Cottingham*, Wm. Collins Sons & Co., N.Y.-473 pp.-cloth-Ill.-$4.00. A descendant of Samuel Pepys reports on his reactions to current life in America after a coast-to-coast tour by road and by air. Interesting to Americans in general, and to aviation people in particular, as the author's long standing participation in aviation had led him to devote about a third of the book to a critique of our air transport. Ourselves as others see us—worth reading.

INTERAVIA A.B.C.—(International Directory of Aviation), Interavia S.A. Geneva, Switzerland. Distributors for U.S.A.—McGraw-Hill Publishing Co., Catalog Division, $7.50. A compendium of information on military and civil aviation in 129 countries and territories; 1133 pages; 93 aeronautical maps, 30,000 addresses. Vocabulary in five languages.

HOW'S THIS AIRLINE BUSINESS?

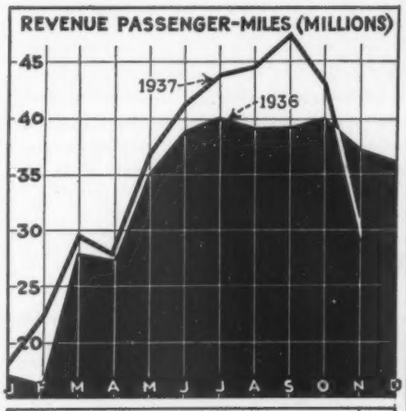
AIR TRANSPORT INDICATOR

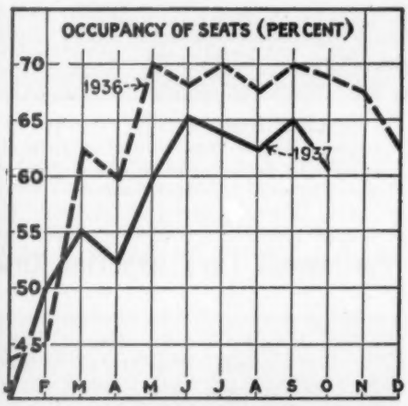
December 1, 1937

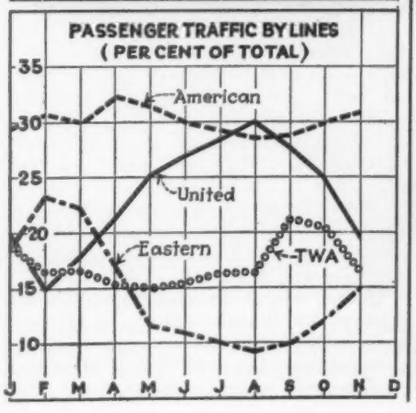
73.9

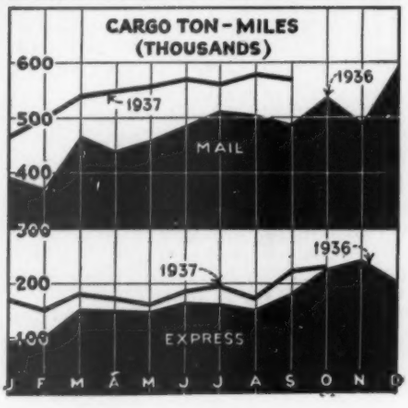
Which is the ratio of the revenue passenger miles reported by the Air Transport Association as carried by all domestic airlines during November, 1937, to the corresponding figure for November, 1936.

For the first time in at least four years this index for a month's passenger traffic has fallen below 100. Causes were bad weather and a business recession which cut that month into the traffic of all forms of transportation. Also November 1936 was exceptionally blessed with decent weather and an absence from normal seasonal trends.









AS OTHERS FLY IT

A Birdseye-View of Aviation Abroad

"THE LAUGHING STOCK OF THE WORLD"? Imperial Airways mechanics—seven of them—busy smearing up a Handley Page biplane with a patent goo called Kilfrost alleged to prevent ice formation. C. G. Grey suggests it is at least a timely "Political Paste."

Parliament Lays Imperial Airways Over the Barrel

AN M. P. NAMED W. R. D. PERKINS, Conservative Member for Stroud, has raised a stink about British Civil Aviation in general and the Imperial Airways in particular that makes Hugo Black's 1934 attacks on the American industry sound like polite and constructive criticisms. Maybe there's more to these blasts.

Parliamentary procedures are a little hard to unscramble from this distance but the moves seem to have been: (1) Mr. Perkins (who is also vice-president of the new British Air Line Pilots Association) stood up in Parliament on Oct. 28 and asked a lot of embarrassing questions of Lieut. Col. Muirhead, Under Secretary of State for Air about Imperial Airways labor policy and the general state of Imperial equipment. The Lieut. Col. answered to the effect that such Imperial Airways affairs were Imperial's business, not the Govt's. (2) Nov. 7, Mr. Perkins enlarged his remarks to include the Air Ministry. (3) Nov. 11 Imperial Airways issued its annual statement with notice of a nine per cent dividend. (4) Nov. 17, Mr. Perkins, having introduced a "private members motion" (whatever that is), gets the floor with a full house and hauls off with all his Sunday punches. (5) After an intense four hour attack that left Imperial's reputation hanging in tatters, the Air Ministry comes through with the appointment of a four-man Committee of Inquiry to be headed by the Right Honorable Lord Cadman, G.C.M.G.

If they can uncover anything the indignant Mr. Perkins left out of his last speech, they are better diggers than General Goethals ever dreamt of being.

Here are some extracts from the *Aeroplane's* excellent account of that performance—

"Mr. Perkins, in pressing his motion for a public hearing, said that nothing less would compel the Air Ministry to action. . . The reason for his motion was his complete dissatisfaction with the present position and future prospects of British Civil Aviation, which was behind the Americans, the Germans and the Dutch. . .

"For a certain very general type of air transport service no modern British civil machine existed; British Airways had been forced to get permission to buy German and American aeroplanes. . . The trans-Canada airline was being equipped entirely with American aeroplanes. . . South Africa had ordered machines and Australia was buying more and more American.

"Croyden, the main airport of London was about adequate for a second-class Balkan State. Wireless bearings from its tower were what was technically known as second-class. The surface had a depression in it which could completely hide a large machine and the prospects of making a first class airport of it, however much money was spent, were remote. . . The London County Council flatly refused to do anything about the matter at all and said it was the Air Ministry's responsibility. . .

(The speaker went on to take a flyer at British railways which have bought heavily into local air lines and which he claimed wished to stiffle airline competition).

"Then Mr. Perkins passed to Imperial Airways, against which he repeated the charge that pilots were being victimized and that representations against inadequate equipment meant dismissal.

"One thing of which he complained particularly was that all criticism seemed to be treated as High Treason . . . he could not help wondering whether Nationalization would not be preferable. He suspected that British aviation was coming under . . . two financial houses . . . D'Erlangers and Whitehall Securities.

"He felt there were urgent grounds for enquiry into the affairs of a company which could in one year increase the returns to its shareholders to nine per cent, raise the total Director's fees to almost twice the previous figure and reduce the salaries of pilots. . . Next year the subsidy of L800,000 would be almost double what it was two years ago. . .

"When the 'City of Kartoum' crashed two years ago the Air Ministry was unwillingly obliged . . . to publish the report . . . the company had regularly been cutting petrol too fine over the Mediterranean . . . better ground organization might have saved some of the lives. . . He then drew a statistical comparison in fatal accidents between Imperial Airways and the Deutsche Luft Hansa, very much to the favor of the latter. . .

"He also expected to hear Imperial Airways credited with carrying more passengers over the Channel than all other air lines put together. This hardy annual has been losing its force gradually since 1933, when it was true. In 1935 the proportion was 50%, in 1936 42%.

"Mr. Perkins said he had been criticised for claiming that the four main services of Imperial Airways within Europe were the laughing stock of the World. He repeated it, and proceeded to give his evidence.

"First the Budapest service. It had been suspended for the Winter and the pilots who used to fly it had been dismissed. Imperial Airways had implied that they had no intention of running a service during the Winter, but the Winter time-tables had already been published, unfortunately.

"The second service was London—Paris—Basel—Zurich, also suspended. They were told it was not a commercial proposition. He had made personal inquiries and found that the Swissair service was increasingly popular, and an extra service to St. Moritz had been suggested.

"The only reason why Imperial Airways could not fly where it pays Swissair to run was that their machines are not able, nor adequately equipped. One day in the Summer three Imperial Airways liners left Croyden for Basel, but because of the weather there they had to land at Le Bourget. Passengers were taken on from there by Swissair.

"The third service was London—Brussels—Cologne. This runs all through the Winter and takes 50% longer than its rivals. The fourth service, London—Paris, again ran to a timing 50% greater than its competitors, including British Airways.

"On the matter of machines Mr. Perkins remarked that the company had admitted the age and obsolescence of the machines and blamed the Air Ministry. That might be justified but did not alter the fact that when he was on some distant aerodrome in Europe during the Summer and some Heath Robinson aeroplane descended from the sky amid general laughter, he felt thoroughly ashamed of British Civil Aviation.

"The Ensign air-liners were said to have been ordered in September, 1934. They were therefore designed three and a half years ago

at least. These machines will not be delivered for another six months and some not for a year, and the thought that the last of them will make its maiden flight when four-and-a-half to five years old was serious.

"Another very serious matter was that of blind-approach equipment. . . For two years Imperial Airways ran their service to Budapest without such equipment on the excuse that it would be no good on the machines if the ground organization were not there.

"Of the seven aerodromes on that route six were so equipped, in fact all but Brussels. Another argument was that Croyden had only been equipped with it this year. Heston has had it for more than two years and an aeroplane on the way from the Continent could have gone to Heston if equipped to do so. Mr. Perkins thereupon claimed that the equipment provided for Imperial Airways' pilots in Europe was definitely inferior to that of its rivals.

"Lastly, as the serious question of de-icing. After the accident to the Empire flying-boat *Capricornus*, near Macon, the pilot, who was not there to defend himself, was blamed. Mr. Perkins said he himself had been flying in the region at the time, and he asked for the weather report later. The weather forecast indicated that ice-forming conditions might be met up to 5,000 ft.

"The *Capricornus* went into it with no kind of de-icer whatever. He was convinced, in spite of the expected hot denials of the Air Ministry, that ice had something to do with the accident.

"Mr. Perkins then mentioned various de-icers, and intimated that as between the Dunlop and the Goodrich types, the Goodrich, by no means 100% perfect but widely used in America and elsewhere in Europe, had been barred from Imperial Airways' machines. . . Imperial Airways were closely connected with the Dunlop Rubber Co., which was in turn a rival of the Goodrich Co. To ban the Goodrich de-icer from Imperial Airways' machines because of the rivalry between the two companies was utterly wrong.

"On the subject of the new Kilfrost preparation he said he would watch the experiment with great interest, although he had grave doubts.

"Mr. Perkins' distinctly spirited speech was very well presented, and held the attention of a well-filled House from start to finish.

PROFITS AND LOSSES

» TRANSCONTINENTAL AND WESTERN AIR, INC., for the three months ended Sept. 30—a loss of $63,689 (after depreciation of $233,072) which compares with a profit of $132,058 for the third quarter of 1936, and a loss of $127,208 for the period ending June 30, 1937.

» BEECH AIRCRAFT CORPORATION for its fiscal year ended Sept. 30—a profit of $14,042 after provision for state and federal taxes. Unfilled orders Sept. 30 stood at $320,000. Net sales for the year totaled $787,575.

» AIR ASSOCIATES, INC.—a dividend on its common stock on record Dec. 14th of 10 cents per share, a dividend on its preferred stock on record Dec. 20 of $1.75 per share.

» NORTH AMERICAN AVIATION, INC.—a dividend of 12½ cents per share on its stock on record Dec. 10.

» UNITED AIRCRAFT CORPORATION—a dividend of 50 cents per share on its stock on record Dec. 3.

» THE SPERRY CORPORATION—a dividend of 60 cents per share on stock on record Dec. 18.

» BOEING AIRPLANE COMPANY—a dividend of 60 cents per share on stock on record Nov. 24.

Ryan Starts Happy New Year

SAM C. BREDER, Ryan Aeronautical Company sales manager, reports that five fuselages of the S-C series have been completed and an additional five are under assembly. These ten planes, of the new cabin type recently introduced by Ryan, are for delivery to established Ryan dealers. Deliveries are expected to start in January, with production schedules set for one plane a week during the first quarter of 1938.

Recent victories for Ryan S-T-A monoplanes abroad: A native sportsman won the annual air race around the city of Sao Paulo, Brazil, flying his Ryan to victory on the 290 kilometer course over a field of twenty-one foreign and American-built planes. In Australia a service pilot flying a Ryan S-T-A won the Victorian Aero Club Annual Derby at Melbourne, October 9th.

Associates Absorb N-B Co.

THE STOCKHOLDERS of Nicholas-Beazley Airplane Co., have approved a plan to combine with Air Associates. The merger gives Air Associates additional sales outlets throughout the country, and is expected to widen the scope and substantially increase sales during the coming year. Combined sales of the two companies during the current year will exceed $1,800,000.00. Present unfilled orders are in excess of a quarter of a million dollars.

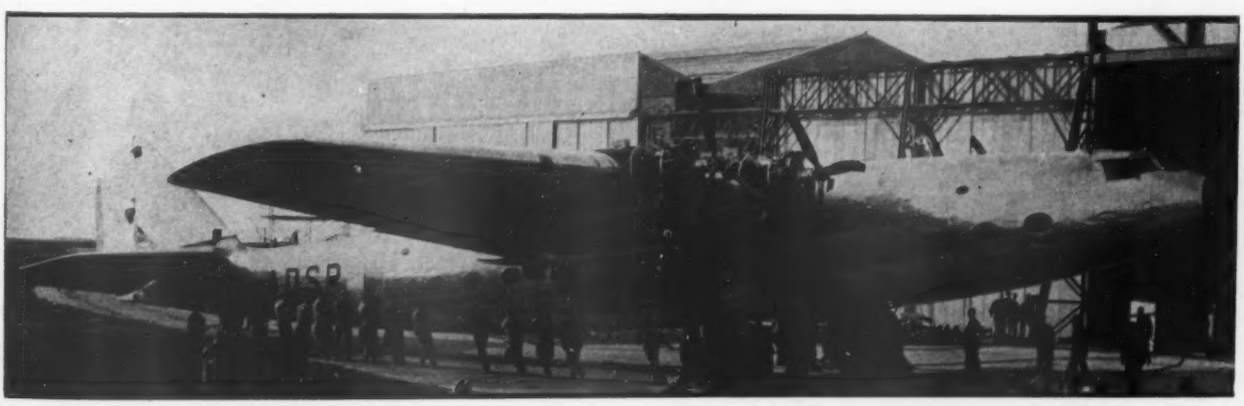
Business Fine, Aeronca

THE AERONAUTICAL CORPORATION OF AMERICA is extremely well pleased with the reception of its new 1938 model Aeronca has received, according to J. C. Welsch, Sales Manager. Sales for this year have increased 103% over last year's total. A carload of Aeroncas left the factory the last week in November for Washington Aircraft and Transport Corporation, Seattle. Early in December another carload Aeronca's California dealer—Joe Plosser—of Grand Central Air Terminals, Glendale, California.

Several planes have been flown recently to Canada for distribution thru General Aircraft Dealers, Ontario, Canada. Some are to be equipped with skis in the winter months and used as seaplanes in the summer.

National Picks Long Beach

J. H. MILLER, president of the National Aircraft Company, announces his firm has signed a lease with the city of Long Beach, Calif., for an eleven-acre site adjoining the municipal airport and will commence construction at once on a factory building 200 x 225 ft., and an administration building 50 x 100 ft. The firm will manufacture a military training plane designed under the supervision of W. C. Rockefeller, and plans to employ 800 workers.



OR THE PRIDE OF THE DEAR OLD EMPIRE—Workmen roll the first Armstrong Whitworth Ensign out of shop. Twelve of these are on order for use largely on Imperial routes to the continent, now under attack. But progress on them has been very slow, probably due to Britain's rearmament program. Wheels retract all the way up into that high-wing which we are told was retained so passengers could have a good view earthward.

Consolidated Cuts Mellon

INCLUDING THE RECENTLY AWARDED NAVY CONTRACT for 33 patrol planes, to cost $4,500,000, the backlog of the Consolidated Aircraft Corp. was above $15,000,000 as of December 10. For the nine months ending September 30, 1937, deliveries totalled $7,726,061. Directors have declared a common dividend of 50 cents per share, first in the company's history, payable Dec. 27 to stock of record December 20, and the regular quarterly preferred dividend of 75 cents payable December 25 to stock of record Dec. 14.

Solar Still in Climb

SOLAR AIRCRAFT HAS REPORTED the fifth successive increase in monthly sales for the period ending November 13, 1937, with a new peak of $37,033.68 for the last four weeks of this period. The company's main activity has been the manufacture of engine exhaust manifolds, which are specified by leading aircraft manufacturers and airlines of the country. Edmund T. Price, president, pointed out that total sales for the 28 week period were $218,152.91, almost equalling the figure of $221,357.24 for the full year of 1936. Current orders total $282,139.54.

Brown Works on 2-Place

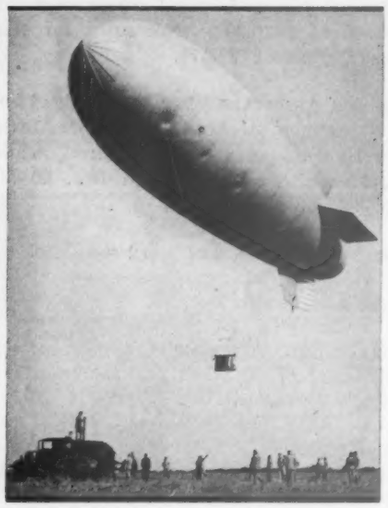
RECENTLY RE-ORGANIZED to undertake the manufacture of a high performance two place cabin monoplane of 90 h.p., the Lawrence W. Brown Aircraft Company, has started development work on the first plane of this type, with flight tests anticipated late in the Spring. Officers are Lawrence W. Brown, Pres. & Gen. Mgr., Charles A. Haufe, vice pres.; Victor Peters, Secty-Treas. One of the chief features of the new Brown commercial plane will be use of the complete Handley-Page system of slots and slotted flaps.

Lockheed Counts Gains

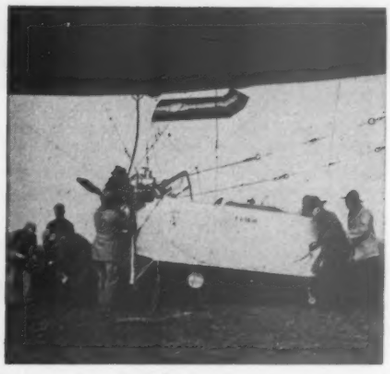
LOCKHEED'S BACKLOG as of Dec. 1 stood at an all time high of $6,125,000, a gain of 169 per cent over the same date in 1936. Much of this increase is credited to recent additional orders received for the new Model 14 Lockheed twin engine transport. Number of Lockheeds delivered in first 11 months of 1937 totalled 85, compared with 30 planes delivered in the same period of 1936. Of the 85 deliveries, 46 were Electras, 34 Model 12's and five model 14's.

Vultee Orders: $6,000,000

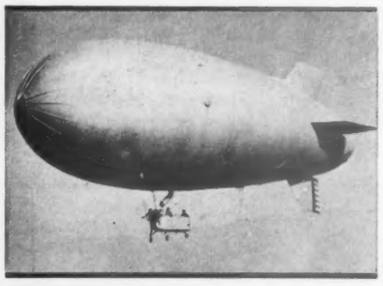
GERARD VULTEE, vice president of Vultee Aircraft division of the Aviation Manufacturing Corp., Downey, Calif., reports orders on hand total an even hundred Vultee attack bombers which, with spares, represents $6,000,000 in undelivered business. Current payroll is 1500, approximately double that of six months ago, and production has passed one plane a week, will go higher. After spending more than $200,000 on factory expansion the Vultee plant now measures approximately 660 ft. long by 300 ft. wide. It is located on an eighty acre airport with a three thousand foot runway, the property of the Vultee company.



THE ARMY'S NEW C-6: serves as a captive balloon with the observers in the standard wicker basket.



HAUL IT DOWN: and attach a small car equipped with a 90 hp. Lambert engine.



SAIL IT AWAY: under its own power at 40 m.p.h.

A Show for the Show

Pageant to Feature Program

"CAVALCADE OF FLIGHT," a dramatic and musical spectacle based on "epochal" scenes in aeronautical history has been announced as a feature of Chicago's Class A Air Show scheduled for Jan. 28 to Feb. 6. Staged twice-a-day in the huge central Arena of the International amphitheatre, which seats 8,000 the "Cavalcade" will have a cast of professional actors, a well-trained dancing chorus, a specially arranged musical score, will be offered as a free attraction. Creating and directing it is John Ross Reed who has already to his credit the pageant "Wings of a Century" presented at the Chicago World's Fair "Saladin" a feature spectacle at the San Diego Exposition and "Light of Ages" staged at Chicago's Charter Jubilee Celebration.

Reports from the show's hard-working management showed more than eighty-five per cent of the great expanse of available space already booked for airplane exhibits—six weeks before the show was due to open. The list of exhibitors included: Aviation Magazine (Come See Us); B G Corp.; Lear Radio; Waco Airplane; Fairchild Aircraft; Ryan Aeronautical; Fleetwings; Aeronautical Corp. of America; Howard Aircraft; Harlow Aircraft; Wendt Aircraft; Bendix Corp.; Breeze; Bruning Co.; Aero Insurance Underwriters; Thompson Products; Radio Corp.; Continental Motors; Everel Propeller; Mercury Mfg. Co.; Elastic Stop Nut; Jacobs Aircraft Engines; Jos. L. Cohn; Chicago & Southern Airlines; Braniff Airways; United Air Lines; United Aircraft Company; Curtiss-Wright; Berry Brothers; Sperry Gyroscope; Lonape Aircraft & Motors; Bellanca Aircraft Corp; Rearwin Airplanes Inc; Spartan Aircraft; Porterfield Aircraft; Lockheed Aircraft; Taylor-Young; Stinson Aircraft; Beach Aircraft; Monocoupe Corp.; Standard Oil Company; Popular Aviation; Aero Digest; Air Trails; Pyle National; Air Associates; Edo Aircraft; Lycoming Motors; Arens Controls; Supply Division; Parks Air College; Kollsman Instruments; Western Electric; Transcontinental & Western Air; Eastern Airlines; American Airlines; Piper Aircraft; P.A.A.; Bendix Radio; Pioneer Instrument; Wright Aeronautical; Hamilton Standard; Pratt and Whitney; Texaco; Scintilla; Eclipse; Northwest Airlines.

Moseley Advances Groenendyke

MAJOR C. M. MOSELEY, president of Aircraft Industries, Ltd., Stinson distributors for Southern California, has made Ed Groenendyke sales manager, with Bill Wright and Bill Cooper acting as salesman and demonstrator-pilot respectively. Dana Boller, formerly Aircraft Industries Ltd. sales manager is flying a Lockheed for E. T. Foley.

Have You Got Any Questions on That CAR?

Herewith Starts a New Feature of the AVIATION NEWS You ask the questions. We'll furnish the answers—or Run Our Washington Specialist Ragged in the Attempt.

QUESTION 0—*Can AVIATION NEWS answers be considered legal interpretations of CAR regulations?*

ANSWER 0—Obviously not. Each answer given in these columns however, is first checked and double checked then submitted to a Washington expert who is close to the councils of those agencies in charge of framing and administering this code-to-end-all-codes.

QUESTION 1—*When will official copies of the CAR be available from the Department of Commerce?*

ANSWER 1—Distribution will probably be made during the month of January 1938.

QUESTION 2—*When did the CAR go into effect?*

ANSWER 2—The Civil Air Regulations became effective November 1, 1937. Provision is made in certain paragraphs and divisions of these Regulations for extension of their practical application at a date later than the Regulations themselves became effective. For example, it is contemplated to administer the Regulations so that pilot's certificates will replace the present pilot license forms upon renewal of the present pilot licenses. Further, with respect to the issuance of an airline competency certificate, in Division 40.4 "airlines conducting authorized operations shall have until ninety days after November 1, 1937, to apply for the airline competency certificate as provided in CAR 40.41."

QUESTION 3—*Under what circumstances may aircraft which are not Federally certificated be flown?*

ANSWER 3—They may not be flown by certified pilots nor flown otherwise on a civil airway, or elsewhere in the navigable air space over the lands and waters of the United States if engaged in interstate or foreign air commerce.

QUESTION 4—*May a limited commercial pilot instruct for hire or not for hire?*

ANSWER 4—No.

QUESTION 5—*May a private pilot instruct for hire or not for hire?*

ANSWER 5—A private pilot may not instruct for hire. He may instruct not for hire provided he is in possession, not only of a private pilot certificate but also a valid instructor's rating as provided in CAR 20.440.

QUESTION 6—*Is it necessary to have a permit to receive flying instruction?*

ANSWER 6—No. (See CAR 20.60).

QUESTION 7—*Is it necessary for applicants for the following pilot's ratings be citizens of the United States?*

a. Student pilot?

Ans.—No. He may be a citizen of any nationality.

b. Solo pilot?

Ans.—No. Same as in (a).

c. Private pilot?

Ans.—No. Same as in (a).

d. Limited commercial pilot?

Ans.—He must either be a citizen of the United States or a citizen of a foreign country which grants reciprocal commercial pilot provisions to citizens of the United States on equal terms and conditions with citizens of such foreign country or an alien who has filed his declaration of intention to become a citizen of the United States, and notifies the Secretary of the serial number of such declaration and of the date thereof and of the court in which it is filed; provided, that the certificate of competency is, in such case, subject to revocation if the holder does not from time to time keep the Secretary advised of the status of the proceedings in court and does not diligently and successfully prosecute them and become admitted as a citizen.

e. Commercial pilot?

Ans.—Same as for limited commercial pilot.

QUESTION 8—*If flight is made along a Civil Airway under contact flight conditions and weather conditions change so as to forbid contact flight operation, what must the pilot do?*

ANSWER 8—A landing must be made at the nearest airport or the flight may be altered so that it may be made in weather conditions as good as or better than the minimums prescribed for contact flight unless the aircraft can and does proceed according to the instrument flight rules.

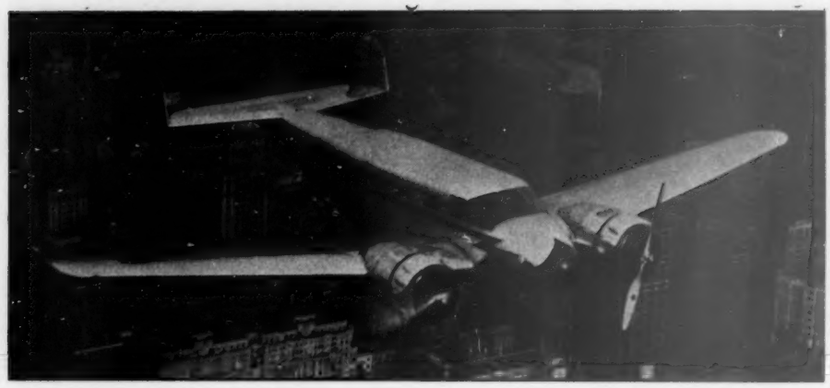
Douglas Pays Bonus

Reports on 1937; expects good 1938. Labor suits progress

NEWS FROM THE DOUGLAS AIRCRAFT COMPANY, Santa Monica, during December included: (1) Word that a semi-annual bonus plan for the entire payroll of more than seven thousand employees has been inaugurated, with the first bonus payment, totalling more than $90,000, to be paid out December 22. The second bonus payment will be made July 1. The bonus payment is at the rate of 3c. per hour for every hour worked since September 30, 1937. (2) A Donald Douglas announcement that, with a $30,000,000 backlog, there would be no curtailment of operations during the winter. (3) Figures showing that Douglas manufactured and shipped abroad 41 airline type planes during the first eleven months of 1937, for a total value of $4,500,000. All but six of these transports were the 21 passenger DC-3 model. Total Douglas production of 1937, including the Northrop division, is expected to exceed $21,000,000. (4) Bulletins on the labor situation: Completing seven weeks of testimony the prosecution rested its case on Dec. 3 against twenty-three Douglas workers arrested in connection with the sit-down strike last February. The defense was expected to take another seven weeks. The C. I. O. union has filed charges against the Northrop division of Douglas charging workers were compelled to sign away legal rights to get back their jobs.

Menasco Set to Go

MENASCO HAS COMPLETED A FACTORY EXPANSION PROGRAM to provide facilities for greatly expanded production of Menasco engines during 1938. One feature was the purchase of a 2½ acre factory site and rehabilitation of a 50,000 sq. ft. factory building. The firm also erected an aluminum foundry and four new concrete engine test houses. Commercial production of the new Menasco 250 h.p. model C6S4 was started in December.



NEATEST TRICK OF THE SEASON: Carl Chader, chief test pilot for O. J. Whitney, Inc., of Floyd Bennett Field, demonstrating one-engined flight over downtown New York. With five passengers and 160 gal. of gas the Beech Model-18 transport took off from Floyd Bennett, braked one of its 285 hp. Jacobs engines, proceeded to climb, circle New York, make a round trip to Philadelphia.

Rearwin Lists Sales

THE REARWIN SPEEDSTER Model 6000M powered with the Menasco C4 125 h.p. motor is now in production. The first Speedster delivery was to Troy Air Service, Troy, N. Y. and two are to be shipped to African Flying Services, Johannesburg, South Africa during December. Recent domestic Sportster deliveries include: Wm. P. Cutter, Albuquerque, N. M;. Midwest Airways, Milwaukee, Wisconsin; L. A. Prosser, Kansas City, Missouri; Douglas Howell, Enochs, Texas; Mrs. A. J. Spicer, Oklahoma City, Oklahoma; Dr. E. W. Wood, Beckley, W. Va.; Aircraft Associates, Long Beach, Calif.; Charping Air Service, Greenwood, Miss; Southern Air Services, Memphis, Tenn.; Troy Air Service, Troy, N. Y.; W. C. Taber, Kansas City, Mo.; and Glasgow Airways, Glasgow, Montana.

Rearwin Sportsters have been exported recently to African Flying Services, Johannesburg; Air Taxi Company, Capetown, South Africa; Tri American Aviation, Buenos Aires, Argentina (2). The second Sportster to Tri American was equipped with Edo floats.

SCHOOL HIGHLIGHTS

» DUE TO THE RAPID GROWTH of its enrollment, the AVIATION GROUND SCHOOL at Elmira, N. Y., has moved into new quarters in a modern factory building. 14,000 sq.ft. of floor area are already in use. An equal area is available for future expansion. A complete shop is being installed. A project of the New York Board of Education, enrollment costs only ten dollars to cover cost of textbooks, goggles for welding, etc. Earl Southee, well known official of the National Soaring Society is Supervisor.

» LIEUT. G. RAY CULLMAN, wartime pilot and an instructor of more than ten years' experience, has become Chief Instructor of Sky Flight, Inc., at Roosevelt Field, L. I. He will be assisted by Eric Oppenheimer.

» THE BABSON INSTITUTE'S school of business administration, Wellesley, Mass., will run a "business school of the air" next June to August for a select group of executives and young men about to start on business careers. The party will spend their Session touring all around Latin America on Pan American and Pan-Grace airlines, "studying conditions."

COMMERCIAL DELIVERIES

AVIATION'S summary of airplane marketing for the month ended Dec. 1, 1937

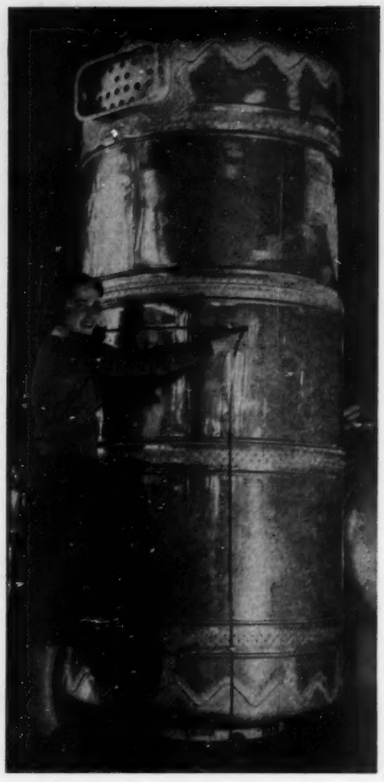
Purchaser and Number of Units	State or Country	Type of Buyer	Manufacturer and Model	Engine Make and Model
J. B. Sass	Okla.	Pvt.	Stinson SR-9F	P. & W. 440 h.p.
Ind.-Aero. Romana	Roumania	Pvt.	Stinson SR-9CD	R-680-D-5
R. O. Wells	Kan.	Pvt.	Taylor-Young A.	Cont. A-40-4
J. Ose	Minn.	Pvt.	Taylor-Young A.	Cont. A-40-4
H. R. Schesselman	Minn.	F. B.	Taylor-Young	Cont. A-40-4
M. P. Baker	Mont.	F. B.	Taylor-Young A.	Cont. A-40-4
Piper A. C.	Penn.	Exper.	Piper, Cub Sport J3	Cont. A-40-4
Hylan, F. S.	N. Y.	F. B.	Piper, Cub Sport J3	Cont. A-40-4
Haller Av.	South Af.	F. B.	Piper J2.	Cont. A-40-5
A. S. da Costa	Port. East Africa.	F. B.	Piper J2.	Cont. A-40-5
A. J. Walter	England.	F. B.	Piper J2.	Cont. A-40-5
A. R. Alcorta	S. Amer.	Pvt.	Piper J2.	Cont. A-40-5
H. C. Lippiatt	Calif.	Pvt.	Waco EGC-7	Wr. R76-OE-2
Tata Sons	India	Trans.	Waco YQC	Jac. L-4
W. T. Green	N. C.	Pvt.	Taylor-Young A.	Cont. A-40-4
Inter City F. S.	Ind.	F. B.	Taylor-Young A.	Cont. A-40-4
R. M. McElroy	Ill.	Pvt.	Taylor-Young A.	Cont. A-40-4
Guinea Airways, Ltd.	Australia.	F. B.	Stinson SR-9F	P. & W. 440 h.p.
2 to Dept of Comm	W., D. C.	Govt.	Stinson SR-9ED	Wr. R-760-E2
F. E. Wall	Mich.	Pvt.	Taylor-Young A.	Cont. A-40-4
M. W. Alford	Kan.	F. B.	Taylor-Young A.	Cont. A-40-4
Tufts-Edgecumbe	Ill.	F. B.	Waco YKS-7	Jac. L-4
Standard F. S.	N. J.	F. B.	Taylor-Young A.	Cont. A-40-4
N. V. Brower	N. Y.	Pvt.	Taylor-Young A.	Cont. A-40-4
E. Nihur	Pa.	F. B.	Taylor-Young A.	Cont. A-40-4
Robertson A. C.	Mo.	F. B.	Taylor-Young A.	Cont. A-40-4
E. T. deOrbeto	Puerto Rico.	Pvt.	Taylor-Young A.	Cont. A-40-4
K. Hartigan	Ind.	Pvt.	Howard DGA-9	Jac. L-5
B. Towne	Calif.	Pvt.	Fairchild 24 G Del.	Warner S. S.
M. Remey	N. Y.	Pvt.	Fairchild 24 H	Ranger-6-390-D-3
N. E. Brittin	Penn.	Pvt.	Piper J2	Cont. A-40-4
Eagle F. Cl.	Ill.	Pvt.	Piper J2	Cont. A-40-4
2 to Miami A. C.	Fla.	F. B.	Piper J2	Cont. A-40-5
Lund A. S.	Utah.	F. B.	Piper J2	Cont. A-40-4
Wiggins A'ways	R. I.	F. B.	Piper J2	Cont. A-40-4
M. Murphy	Ind.	Pvt.	Piper J2	Cont. A-40-4
A. Gutierres	Mex.	Pvt.	Piper J2	Cont. A-40-4
C. F. Johnson	Nev.	Pvt.	Beech D17S-183	P. & W. 450 h.p.
H. A. Hammill	Texas.	Dealer	Beech D17R-137	Wr. 450 h. p.
H. R. de Bustamate	Fla.	Pvt.	Beech E17B-193	Jac. 285 h. p.
Oerlikon Wks.	Switz.	Pvt.	Fairchild 24 H	Ranger-6-390-D-3
F. D. Hilaire	Br. West Africa.	Pvt.	Piper J2	Cont. A-40-4
2 to Cub A'craft	Canada.	F. B.	Piper J2	Cont. A-40-4
E. V. Monteire	Port. West Africa.	Pvt.	Piper J2	Cont. A-40-5
Camel City F. S.	N. C.	F. B.	Piper J2	Cont. A-40-4
St. Louis F. S.	Mo.	F. B.	Piper J2	Cont. A-40-4
Wm. Breedlove	Texas.	F. B.	Piper J2	Cont. A-40-5
Brayton F. S.	Mo.	F. B.	Piper J2	Cont. A-40-4
Aviation Supply	Ga.	F. B.	Piper J2	Cont. A-40-4
R. A. Gile	Kan.	Pvt.	Piper J2	Cont. A-40-4
Tate & Clark	W. Va.	Pvt.	Piper J2	Cont. A-40-4
A. M. Crabtree	Fla.	Pvt.	Fairchild C8 F	Ranger-6-390-D-3
State of Florida	Fla.	Govt.	Fairchild 24 G Del.	Warner S. S.
Baron von Romberg	Calif.	Pvt.	Beech E17B-194	Jac. 285 h. d.
Starratt A'ways	Ontario.	Trans.	Beech S18A-172	Wr. 320 h. p.
R. I. Toluton	Ohio.	Pvt.	Taylor-Young A.	Cont. A-40-4
F. A. Lane	Ohio.	F. B.	Taylor-Young A.	Cont. A-40-4
A. W. Maynard	Fla.	Pvt.	Taylor-Young A.	Cont. A-40-4
2 to Southern A'ways	Ga.	F. B.	Taylor-Young A.	Cont. A-40-4
Thompson F. S.	Utah.	F. B.	Taylor-Young A.	Cont. A-40-4
Southern A'ways	Ga.	F. B.	Taylor-Young A.	Cont. A-40-4
A. S. Peirce	Md.	Pvt.	Piper J2	Cont. A-40-4
2 to Piper A. C.	Penn.	F. B.	Piper J2	Cont. A-40-4
E. H. Brockenbrough	N. C.	F. B.	Piper J2	Cont. A-40-4
Lubbock A. Cl.	Texas.	Pvt.	Piper J2	Cont. A-40-4
C. J. Whitney	N. Y.	Dealer	Beech 18B-170	Jac. 285 h. p.
F. W. Martin	La.	Corp.	Beech D17S-136	P. & W. 450 h. p.
H. H. Batt	Calif.	Dealer	Beech E17B-191	Jac. 285 h. p.
Stevens, Hunt, Cominsky & Iandolie	Mass.	Pvt.	Taylor-Young A.	Cont. A-40-4
2 to Hubert & Dillon A.	Wash.	F. B.	Taylor-Young A.	Cont. A-40-4
L. V. Ciccarelli	Ohio.	Pvt.	Taylor-Young A.	Cont. A-40-4
Aircraft S. & Service.	Mich.	F. B.	Taylor-Young A.	Cont. A-40-4

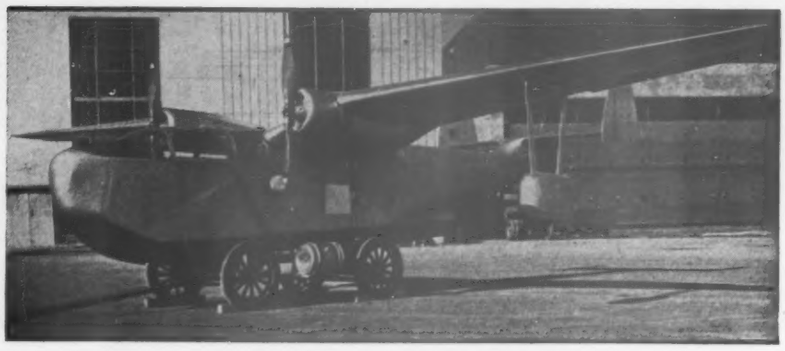
Bound for foreign shores, the giant new Martin Ocean Transport has been delivered to its purchaser. It is an accomplished fact. It has met its unprecedented performance guarantees. It establishes new world standards. The same design, and greater and more efficient developments from it, are available to American and foreign operators interested in practical long-range equipment for the ocean air routes of the world.

THE GLENN L. MARTIN COMPANY

BALTIMORE, MARYLAND, U. S. A.

Builders of Dependable TRADE MARK *Aircraft Since 1909*





THE AGE OF BIG BOATS—is already here. In the December issue of AVIATION we described Martin's new Ocean Transport, gross weight 63,000 lb. On page 30 of this issue is a description of the Consolidated XPB2Y-1, matching effort to the Sikorsky "flying dreadnaught" already in Navy hands. On page 24 are plans for a Consolidated trans-oceanic transport of 110,000 lb. The plane sitting on the hand truck above is something new under the sun—a model of a future aircraft, faithfully quarter-scale yet big enough to fly. Built by the Glenn L. Martin Company of Baltimore, it represents that company's next big boat project. With full working parts, and mounting a 90 hp. Martin motor (driving both props through V-belts) it has already carried a test pilot through hours of investigations. From it have come invaluable data on the ship's performance, stability and water handling characteristics. Already modifications have been made in the full-scale design that would have cost thousands to make in the finished ship. Later this model is scheduled for tests in the NACA tunnel. At the left is a tank, one of six which will carry the 4,200 gal. of fuel supply of the Boeing-314 clippers. A nine-foot 600 gal. one like this will go into each wing. Six even larger will be built into the sponsons. The first Boeing 314 is due "outdoors" next month.

Lindbergh Writes Letter

(*Continued from page* 51)

any proposal should combine structural accessibility and economical maintenance with the highest practicable ratio of useful load to structural weight. Particular attention should be given to corrosion resistance and consideration will be given to designs involving the use of either stainless steel alloys, or aluminum alloys. The airplane should have its maximum over-all lift-to-drag ratio, its maximum propulsive efficiency, and its minimum specific fuel consumption, at its intended cruising speed.

"At the manufacturer's option, the price estimates for lots of three, six and twelve aircraft may be estimates subject to adjustment, for the purpose of arriving at the basic prices to be quoted in part 'Second' of the proposal, on the basis of a formula appropriately reflecting changes in shop labor costs and in the cost of a basic material (e.g. 24 ST alclad or stainless steel) in the period from the date of submission of part 'First' to the date of submission of part 'Second' of the proposal. Such formula must be stated in detail in part 'First.'

"The prices quoted for lots of three, six and twelve aircraft may, at the option of the manufacturer, be basic prices subject to adjustment, in accordance with the formula set forth in part 'First' of the proposal, to reflect changes in shop labor costs and in the cost of a basic material (e.g. 24 ST alclad or stainless steel), during the period from the date of submission of part 'Second' of the proposal to the date of acceptance of the contract by Pan American Aviation Supply Corporation, the manufacturer to furnish information as to any such adjustments in the basic prices when requested.

Part two Specifications must include among a hundred or so other items:

"Curves of propulsive efficiency against propeller revolutions per minute for various brake horsepower values at sea level, 10,000 ft., 15,000 ft., 20,000 ft., 25,000 ft.; for speeds of 200 M.P.H. at sea level; 233 M.P.H. at 10,000 ft.; 252 M.P.H. at 15,000 ft.; 274 M.P.H. at 20,000 ft.; and 299 M.P.H. at 25,000 ft."

What shape things to come?

One detail looms up by its absence. Nothing in the whole invitation indicates whether Pan American wants a flying boat or a land plane. Presumably an airship might even be acceptable—if it could meet the speed and altitude requirements—although no airship builder was asked to bid. How big would these ships have to be? What would they cost? Could such big land planes use present fields?

Just roughing things out on the back of envelopes, most of our slide rule friends come out with flying boats of gross weights of about 200,000 lb. Biggest design problems seem to be engines (What's big enough?); propellers (how can you keep them small enough?); and that huge supercharged cabin feature. Price guesses run from from $1,500,000 each up to about $3,000,000.

Visionary or no

No matter what the outcome, Pan American's asking such bids at just this time made one smart move. Technically it promises them a chance at a big extension of that two year lead over all opposition they've held since they got their first Martin-130s and Sikorsky S-42s—and which the Boeings should hold for them until 1939.

Politically it takes a great deal of the steam out of the drive for Maritime Commission control of ocean air routes. Or, if that control develops and subsidies are forthcoming to help build big flying boats—where better start helping than on these, by that time, in-hand projects?

NASAO Confers

(*Continued from page* 52)

cussed by Pan American President Trippe, T.W.A. President Frye, and A.T.A. President Gorell. In his address, Colonel Gorrell asked for a sound permanent pattern for the transport industry, for carefully devised, comprehensive, and permanent regulation that will protect the public.

Airport papers were read by Fred Smith, Col. Sumpter Smith, Corrington Gill, Cammy Vinet, Chester A. Charles, and Major A. B. McMullen. In the latter plans were outlined to collect material by questionnaire to show the facilities now existing, the cost of developing and maintaining those facilities, and the cost of the land upon which the airport is located.

Unbending the Beams

(*Continued from page 21*)

J. Installation of counterpoises for stabilization of radio range courses at approximately fifty existing TL type radio stations.

K. Commissioning ultra high frequency radio station location markers to replace or supplement the cone of silence at Washington, Newark, Chicago, and Kansas City.

L. Commissioning of airways lighting on following routes hitherto unlighted.

Atlanta-Augusta, Ga.
Helena-Great Falls, Mont.
Portland-Bangor, Maine.
Concord, N. H.-Burlington, Vermont.

M. Installation of approach lights for radio approach landings at

Amarillo, Tex.	Cleveland, Ohio
Fort Worth, Tex.	Buffalo, N. Y.
Kansas City, Mo.	Memphis, Tenn.
Salt Lake City, Utah	Newark, N. J.
Columbus, Ohio	Pittsburgh, Penna.
Indianapolis, Ind.	

N. Commissioning important new intermediate fields at Gordonsville, Virginia, Crossville, Tenn., Enterprise, Utah, and Delta. Utah.

Radio Aids to Navigation

The Bureau's program, so far as radio facilities are concerned, is twofold: the improvement of the existing radio-range service, and the installation of new beacons, both of the conventional radio-range type and also of the ultra-high frequency type. These latter "u-h-f" beacons are of two types, the so-called "cone of silence" marker, and the fan-type or "curtain" marker. Both are used in conjunction with the radio range equipment, but operate in an entirely different frequency range and require a separate receiver on the plane.

The first part of the program, improvement of the radio range facilities, is the culmination of development was has been in progress for three years. At present steps have been taken to improve the stability of some 50 type TL radio range beacons throughout the United States. The improvements consists in part in installing counterpoises under the towers and in part improving the transmission lines which feed the radio-frequency energy to the towers. It has been known for some time that changes of tower-to-ground capacity, due to weed growths or drifting snow, may considerably change the phasing of the currents in the towers and result in course-shifts. Automatic phase-change compensating circuits have been used to correct this effect, but their efficacy depends upon the use of a transmission line whose power loss is very small. The parkway cable formerly used is, where necessary, being replaced with $\frac{7}{8}$ in. coaxial transmission line which operates under gas pressure, and which has a very low power loss. The ability of the phase-change compensators to correct instability is thereby improved by some 600 per-cent.

Many existing radio range stations are being improved by the addition of equipment for voice transmission, that is, by conversion to the "simultaneous radio range and communication" type. Of approximately 100 such installations now contemplated, two full power and 21 medium power installations are now commissioned or will be completed by Jan. 1, 1938.

The program calls for a considerable number of ultra-high frequency beacon stations. The "cone of silence" markers are intended to give the pilot a definite and positive indication when he passes over the towers of a radio-range station, thus supplementing the uncertain "negative" indication previously used. These markers, 100 of which are now on order, operate on 75 megacycles (4 meters) at a power of 5 watts, and are modulated continuously at 3000 cycles. They emit a cone-shaped signal pattern whose axis coincides with the cone of silence of the radio-range.

The other type of ultra-high frequency marker, the "curtain" type, also operates on 75 megacycles but at higher power, 100 watts. The 3000-cycle modulation is keyed with a distinctive identifying signals. The transmitter output of this type of marker is fed to four half-wave radiators, arranged end-to-end in the direction of the radio-range course. By the use of quarter-wave coupling sections between the radiators, they are all fed in phase, and thus produce a signal pattern having a fan-like or curtain shape the plane of the "curtain" being at right angles to the radio-range course. The pattern is about 12 miles wide at 3000 feet altitude and about three miles thick. The pattern also has two small lobes which lie directly on the course, so that the pilot, if he is directly on the center of the beam, receives three indications, but only one indication if a mile or two to the right or the left. Approximately twenty beacons of this type are now on order. They will be used to give definite "fixes" on important range courses, for traffic control "block signals" and to warn the pilot of high ground and other obstacles.

Both the "cone-of-silence" and "curtain" markers actuate a special type of receiver, specifications for which were issued last spring. The receiver is a fixed-tuned (75-megacycle) superheterodyne, using a crystal-controlled oscillator to produce an i-f frequency of 4.8 megacycles. The output of the second detector actuates an aural circuit for headphones, and likewise operates a relay through an auxiliary rectifying tube. The relay controls an indicating lamp on the instrument panel.

Continental A-50

(*Continued from page 34*)

Mounting with the engine torque carried by rubber bushings in shear can be accomplished readily according to Lord Manufacturing Co.

The heat treated alloy steel forged connecting rods are of conventional design. The split bit and bearing is the replaceable thin steel shell type with cadmium bearing lining. A bronze bushing is pressed in the piston pin end.

The pistons are permanent mold Alcoa "Lo-Co" trunk type design. The piston pins are full floating located by button end plugs each end. The American Hammered piston rings consist of two compression rings and two oil rings—one above and one below the piston pin.

The gearcase casting at the anti-propeller end of the engine provides supports for ignition units, oil pumps and tachometer drive and starter and generator (Series 2). The gearcase has the two crankcase vents, one to be connected to the oil tank, the other to the carburetor entrance. There are the engine oil drain at the bottom, a pressure oil line screen, the oil relief valve and drilled oil lines to connect with the crankcase oil feed lines.

Carburetion is supplied by an updraft Stromberg NA-S3 carburetor connected to a cast aluminum "X" manifold jacketed for exhaust hot spotting. Tests show that an air

(*Turn to page 68*)

Marketing "Down Under"

(*Continued from page 27*)

in the meantime economic conditions may change in the Republics. If a purchaser is sold on the equipment, has the cash to pay for it, and the exchange is unfavorable, he will no doubt wait to make his initial deposit or full payment. Suppose, for example, the c.i.f. price of the equipment is $5,000. If the rate of exchange has been fairly steady over some time, say, 10 to $1 (which makes the purchaser deposit 50,000 units for the equipment) and then breaks to 15 to $1., the purchaser must pay an extra 25,000 units, which boots the c.i.f. price to $6,666, with the dollar price steady. Exchange does play a big part on sales, although a five point change does not often happen. It is a good idea also to know the general outlook on the cattle, wheat, coffee and cotton markets because a good year means ready money and sales.

Due to past irregularities in the South American market in receiving payment for merchandise shipped, the general opinion prevails that cash with the order is the safest procedure. Some manufacturers require a small down payment with the order, with the balance at the factory before the equipment is moved. Others require one-third to one-half down with the balance against shipping documents. The only suggestion to smooth over European competition of accepting order under any conditions is to prepare a letter explaining courteously that the manufacturer works on a very small margin and is unable to accommodate any long term payments. Short and impersonal replies which are understood in the United States are sometimes misconstrued as a slight to a Latin-American integrity and dignity. Personal experience has shown that this problem is rather touchy.

A PARTICULARLY SORE SPOT with South American buyers is charge for crating. This may vary from $100 for light aircraft to as much as $500 or more for larger equipment, a legitimate item which protects the manufacturer and cuts insurance costs for the buyer. Many commercial representatives operating for manufacturers ignore the question of the cost of crating by passing the buck to the factory. Explanation should be made to the customer of the need for careful crating, but as a suggestion to save expense it is often possible to get away with open crating for fuselages with complete boxing for wings only.

From other personal observations the lack of translated material is a handicap to sales. A catalogue in English is appreciated, but if a manufacturer is pointing towards getting more sales in Latin-America it is quite necessary to spend a small amount for catalogues in Spanish and Portugese. Two methods are suggested: (a) let your representative arrange your translation and printing in his own country, or, let your representative translate your material and return it to the factory to be made up in the states. A still cheaper method is to have the translated material mimeographed for insertion in your regular English. In any case extensive pictorial treatment should be used, even at the higher printing costs entailed. In your catalogues note carefully the availability of any extra equipment such as wing patches, dope left over from paint jobs, etc. as such things are greatly appreciated. Lenghty technical discussion on overhauls may safely be left in English. That is a problem for the mechanics to wrestle with. Most individual owners are usually wealthy and their interest in the airplane is to fly it. They can't be bothered with mechanical details. If anything goes wrong the owner always blames the representative and the factory anyway.

Thorough instructions for daily operations and daily servicing should be provided (in mimeograph form, at least) in the language of the purchaser. It is a good idea also to have a stamped metal plate mounted in the cockpit giving detailed starting instructions.

There are few South American aviation publications, and it is doubtful that commercial aircraft manufacturers care to or can afford to set aside appropriation for this type of contact. It is also true that representatives do not use these publications extensively, except for institutional advertising of the representative or his company, or the manufacturers he represents. When the manufacturer releases a new model, representatives usually arrange pictures and specifications for a single issue. Experience has shown that such advertising brought inquiries but the same inquiries had also contacted the manufacturers, which again brings us back to the problems presented in the article. Personal opinion is that a moderate amount of advertising placed in local publications at a time favorable to sales would be good business. The makeup of the copy would necessarily be somewhat different than what is used in the United States—something more on the personal appeal and sportiness of the equipment.

The South American market has interesting potentialities. It is highly important, however, to acquire a thorough understanding of the make-up of the Latin-American and to bear in mind that he is being kept under constant pressure by English, German, Italian, Dutch, Czecho-Slovakian, and French manufacturers to buy their equipment. Nevertheless the individual prefers American equipment and will buy it if American factories will properly back up the efforts of their own representatives in the field. The latter cannot be expected to assume the entire responsibility. Helpful suggestions, careful and complete answers to inquiries, courtesy and careful attention to the customs and business procedure as practices in South America, will give the American manufacturer of commercial aircraft a big return for the small amount of effort involved.

Continental A-50

(*Continued from page 67*)

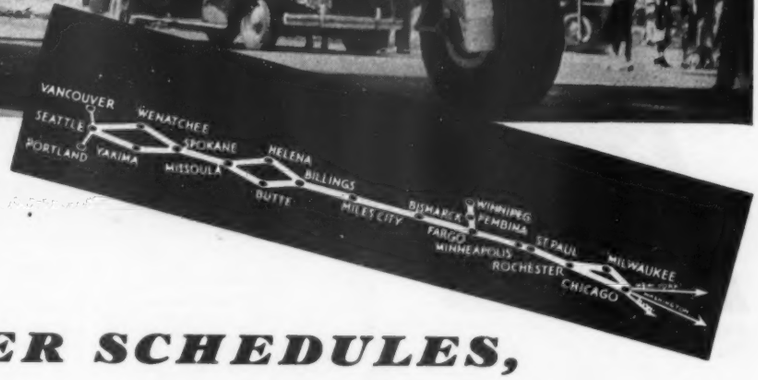
intake scoop with egg crate type straightener vanes at the carburetor entrance is required.

Specifications

Continental A-50-Direct drive
Type ..Air-cooled, two-bank horizontally opposed
Number of Cylinders.....4
Bore .....3⅜ inches
Stroke .....3⅝ inches
Displacement .....171 cu. in.
Compression Ratio.....5.4 to 1
Fuel....Gasoline 65 octane minimum
70 octane or better recommended
Power Rating.....50 horsepower at 1900 R.P.M.
Weight .....150 pounds (Series 1)
Length Overall...30⅜ inches (Series 1)
Width .....31⅛ inches (All series)
Height .....23 inches (All series)
Mount Bolt Centers..7 inches width upper
10½ inches width lower
11⅞ inches height

KOLLSMAN EQUIPPED THROUGHOUT

NORTHWEST AIRLINES' NEW LOCKHEED 14's



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Northwest Airlines, proud of its Award for safest operation, is maintaining and reinforcing its high standards of flight security with its new Lockheed 14 Sky Zephyrs. Cruising at 230 miles per hour, and with a top speed of 260, these exceedingly fast transport planes fly with Kollsman Precision Instruments guarding every swift, smooth mile between Chicago and the Coast.

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It's a swell feeling . . . . .

Fig. 1513

to know that vibration can't loosen a single nut the slightest bit . . because they're

UNSHAKO

The Nuts That Can't Shake Loose

Even though the mechanics have checked every nut, once a plane leaves the ground, vibration gets to work trying to loosen them up again.

With "Unshako", vibration is licked. It just can't shake loose once it has been tightened up. Yet the nut can be removed, without the slightest trouble, when a wrench is applied.

Because "Unshako" is entirely self-contained there are no pins or washers or anything to get lost or forgotten.

You should find out more about "Unshako". Write for the complete story.

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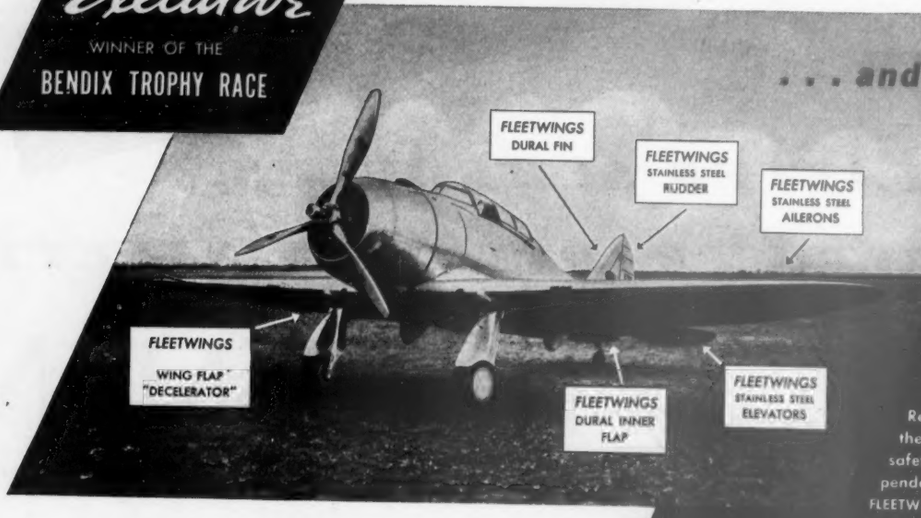

. . . standard equipment on Fuller's as well as on hundreds of other racing, commercial, pleasure and military craft.

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Recognized as one of the great contributors to safety, speed and dependability in aviation, FLEETWINGS are pioneers in the use of Stainless Steel in aircraft, the newest and most outstanding form of strong but lightweight structures. Make it a point to use surfaces constructed by Fleetwings, especially those employing Fleetwings Stainless Steel.

FLEETWINGS
INCORPORATED
BRISTOL PENNA.

Vultee Attack Bomber V-11GB

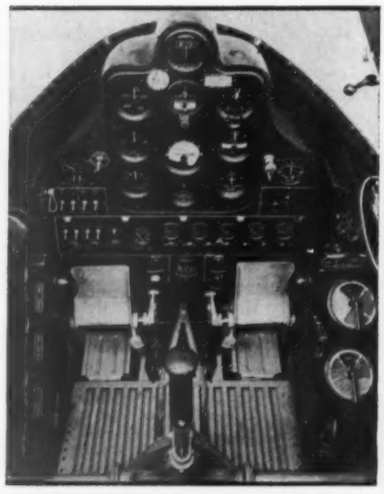
(*Continued from page 33*)

sheet aluminum, with spanwise corrugations, and with the smooth outer skin riveted directly to the corrugated sheets which are, in turn, supported at intervals by internal ribs. The minute and detailed attention given to maintenance features is everywhere in evidence.

For example, the leading edge of the outer wing panels is quickly detachable by means of four independent sections to each wing. Thus the entire wing structure, gun mounts, landing lights, landing gear mechanism, etc., may be quickly reached. For routine inspection the customary metal inspection flaps are provided at every necessary point, such as aileron and flap controls, etc. Wing tips are quickly removable, as are the wings. Fuel tanks are mounted through quickly detachable hatches in the bottom of the wing and fuselage, permitting easy removal. All parts of the plane's plumbing and electrical system are arranged for easy access. In the case of the landing gear, an ingenious transmission applies electric power either to the job of operating the gear, or of controlling the landing flaps, and the same transmission may be used to apply hand control if the electric system fails. This entire system is located adjacent to the wheel wells into which the landing gear retracts. Metal enclosures protect the mechanism from weather, etc., but these enclosures are quickly removable for access to the operating machinery. This same ease of access applies throughout the engine section and installation of all equipment in the fuselage proper. An emergency landing skid, a substructure built into the under side of the fuselage, is provided to take the shock of wheels-up landings away from the structure of wings and fuselage proper. Another practical feature is the covering of landing flaps with a heavy sheet of rubber to protect the aluminum from rocks and gravel thrown up when operating from un-improved fields.

Normal crew consists of three, pilot, rear gunner and co-pilot, and bombardier. The bombardier may also serve as photographer-observer, and the rear gunner also acts as radio operator. The plane is normally equipped for both night and day operation, including navigation and landing lights, lighted instrument panels, flares for night landing, etc. In addition to the complete set of instruments and controls in the front cockpit, the co-pilot and rear gunner has an auxiliary set of instruments as well as the extra set of controls.

Biggest bombs carried outside



A clean and convenient cockpit

Specifications

Wright Cyclone engine — Model GR-1820-G2 — 850 h.p at 2100 rpm at 5800 ft. Hamilton-Standard three blade constant speed propeller.

Span overall	50 ft. 0 in	15.25 m.
Length overall	37 ft. 5¼ in	11.42 m.
Height overall	10 ft. 0 in	3.05 m.
Total wing area	384 sq. ft	35.71 sq. m.

I. *Equipped for medium range attack missions:*

Weight empty	6176 lb.	2801 kilograms
Useful load:		
20–30 lb. bombs.	600	272.2
4 — Fixed guns.	236	107.0 (Inc. 2400 rds. amm.)
1 — Flexible gun	60	27.2 (Inc. 600 rds. amm.)
Bomb sight	12	5.4
Radio installation	122	55.3
Crew	600	272.2 (3 men, parachutes)
Fuel	1500	680.2 (250 gal. or 946 liters.)
Oil	135 lbs.	61.2 (18 gal. or 68.1 liters.)
	3265	1480.7
Gross weight	9441 lbs.	4281.7 kilograms

Performance — full load

High speed — sea level	214 mph	344 kph
Max. speed	229 mph	369 kph
Cruising speed	207 mph	333 kph
Landing speed	67.5 mph	109 kph
Max. rate of climb	1285 ft. per min.	393 mpm
Service ceiling	23,000 ft	7,010 m.
Range (cruising)	1225 miles	1970 km.

II. *Equipped for long range bombing missions:*

Weight empty — attack mission	6176 lbs	2801 kgs.
Less weight of internal bomb canister	—85	—38.5
Weight empty — bomber.	6091	2762.5
Useful loads:		
1 — 1100 lb. bomb	1125	510.2
2 — fixed guns and 1200 rds. amm	118	53.5
2 — Flexible guns and 1200 rds. amm	120	54.4
Bomb sight	12	5.4
Radio installation	122	55.3
Crew — 3 men and parachutes	600	272.2
Fuel — 504 gal. (1908 liters)	3024	1371.0
Oil — 30 gals. (113.6 liters)	225	102.0
	5346	2424.0
Gross weight	11,437	5,186.5

Performance — full load

High speed — sea level.	203 mph	326 kph
Maximum speed	220 mph	354 kph
Cruising speed	188 mph	303 kph
Maximum rate of climb	880 ft. p. min.	268 m. per min.
Service ceiling	18,400 ft	5,615 m.
Range	2380 mi	3830 km.

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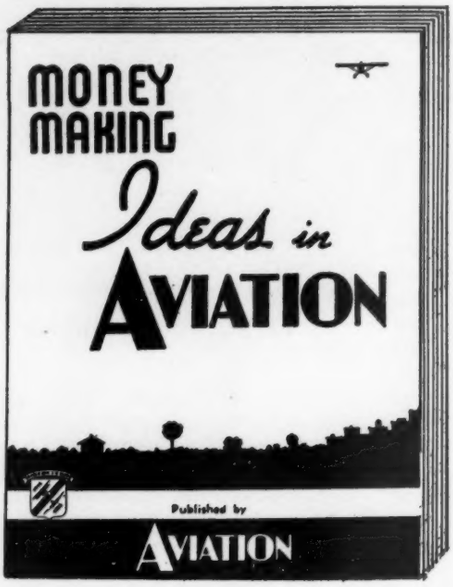

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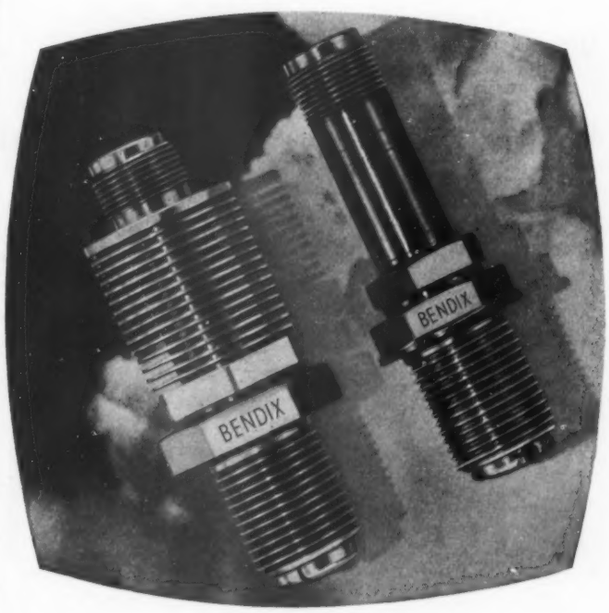

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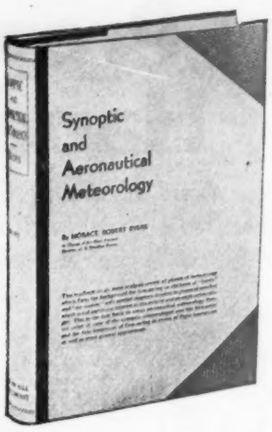

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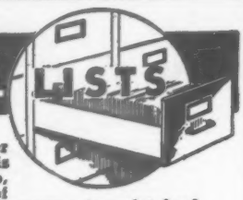

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January, 1938

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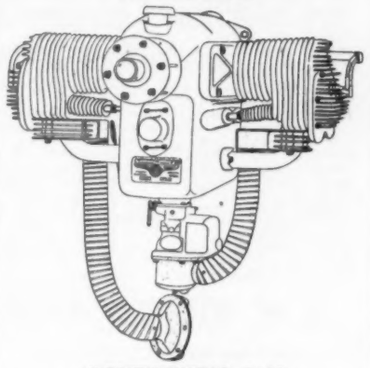

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For Additional Advertising of Used Planes, Engines and Parts For Sale, and Products and Services Offered see pages 82 and 83

Planes, Engines and Parts For Sale—Products—Services

(Continued from Pages 80 and 81)

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Believing that you, our customers, will appreciate a classification of "Certified Aircraft"* according to usefulness and operation costs, we are innovating this type of listing service in the hope that it will aid you in obtaining an airplane to suit your taste and pocketbook.

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1936 STINSON, NC 16102, total time on ship 550 hrs. 245 Lycoming just maj. overhauled. Smith prop., bank & turn, rate of climb, thermocouple, manifold pressure gauge, radio, landing lights, flares, flaps, large gas tanks, grey and white, leather upholstery. Price $5,700.

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Continued from pages 80, 81 and 82

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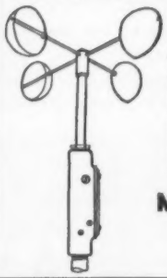

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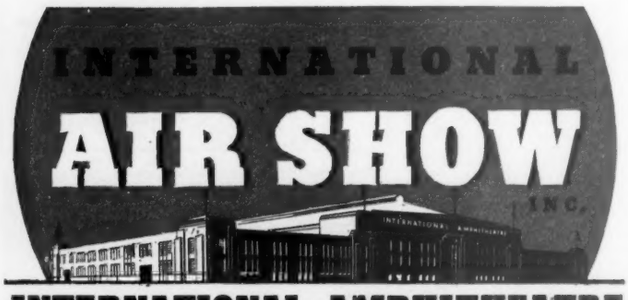

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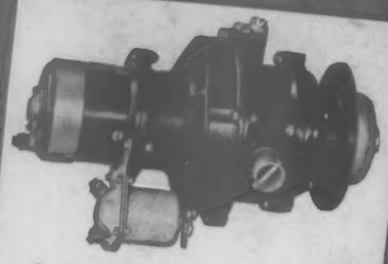

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